TG10.4 – Electrical, Communications, Security, Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-222	7/16/2014		28 40 00-20, 2.2 28 40 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-225	7/16/2014		Page 20, 2.2 28 40 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-309	7/21/2014		1.1D 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-336	7/23/2014		Para B.5. 28 31 76/APA	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-376	7/31/2014		ECS 28 31 76/APA	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-377	7/31/2014		28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-379	7/31/2014		ECS/PA 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-380	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-381	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-382	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-383	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-384	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-385	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-411	8/4/2014		28 31 76/APA	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-485	8/20/2014		Para: 2.8.A Spare Parts 26 33 53	What does this mean? Level 25 Spare Parts.	Provide a basic package of spare parts to replace 25% of the components that could fail, including all fuses.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-498	8/21/2014	SE1-4001, SE1-6001,	Para: 10, Detail: SE1-4001/12 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-518	8/22/2014		28 23 00-37, Para 2.2D 28 23 00	Substitution Request for Video Analytics System. Is it acceptable to substitute the specified manufacturer on specification section 28 23 00-37, 2.2.D i.e., BRS System with Agnet VI System for Video Analytics System. Please see the attached substitution form and product data for the same.	The proposed substitution does not meet the requirements in Specification Section 28 23 00 paragraph 2.1.D.2.o.
TG10.4-521	8/25/2014		Para 2.5 , A,B,C,D, Video Modular Matrix 27 41 17	Substitution Request for Video and Application Processor. Is it acceptable to substitute the specified manufacturer on specification section 27 41 17, Paragraph 2.5- A,B,C,D with Galileo Digital Video and Application Processor by RGB Spectrum. Please see the attached substitution form and product data for the same.	Yes, this substitution is acceptable, provided model GO56, which allows the higher input/output channel count, is selected.
TG10.4-530	8/25/2014	E-0011		1) Is there a specification sheet for the "combination camera/occupancy sensor ceiling mounted" as called for on sheet E-0011 and as shown on the lighting plans? 2) Are these devices expected to be connected to the Quantum system? 3) What is the expected control with regard to the camera portion of the sensor?	1) Please refer to Specification Section 26 09 33 paragraph 1.3.A.2.a.2 for system description of lighting controls in Public Circulation Areas and Transit Bus Facility. 2) Per Specification Section 26 09 33 paragraph 1.3.A.2.a.2, Trade Subcontractor can provide internet based occupancy sensor node and/or video sensor nodes for load shedding. 3) Devices will be connected to the Lighting Control System.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-532	8/25/2014		26 33 53 or 26 33 54 , Para : 1.10 Warranty	The battery warranty is clearly defined. With regard to the UPS and lighting inverter warranty coverage, there are additional details that need further clarification: With a warranty in place, what are the expectations? On site service - Yes or No? Response time to trouble call: 8hrs or 24hrs? Availability of on site technician: 7x24, Next Day, or Next Business Day? Are Preventative Maintenance visits required - Yes or No? If yes, Annual or Semi-Annual? If yes, 7x24 or M-F (8am - 5pm)?	Provide the full 10 year battery warranty as specified. No on-site service is required.
TG10.4-540	8/26/2014		28 13 00, page 20, Access Control	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-541	8/26/2014		28 13 00, Page 48, Access Control	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-559	8/29/2014		28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-560	8/29/2014		28 16 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

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TG10.4-561	8/29/2014		28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-563	8/29/2014	E1-4404 & E1-5005 Dimming Panel EDHM-2-B-1	26 09 33/APA	1) Plan view drawing E1-4404 shows Dimming Panel EDMH-2-B-1 located at column lines 14/E.6 in "Electric Room" B #02465. 2) Dimming Panel EDMH-2-B-1 does not show up on the single line drawings, nor is any schedule provided for it in specification section 26 09 33/APA. Please provide missing panel schedule for Dimming Panel EDMH-2-B-1. 3) Please also provide electrically engineered single line drawings, revised to include a feeder supplying power to Dimming Panel EDMH-2-B-1.	1) Panel EDMH-2-B-1 should be labeled EDMH-2-B-EMG. Please refer to attached sketch SKE-TG10.4-563 for revision. 2) Please refer to sheet E1-5005 for power feeder information. 3) Please refer to panel schedule for EDMH-2-B-EMG, most recently issued on 07/22/2014 as part of MEP Addendum 4.
TG10.4-564	8/29/2014	E1-4400 Series, E1-5005, Dimming Panel EDHM-2-B-EMG	26 09 33/APA (Pg 42)	Specification Section 26 09 33/APA (Pg 42) is the schedule for Dimming Panel EDMH-2-B-EMG. Dimming Panel EDMH-2-B-EMG is shown on single line drawing E1-5005, but is not shown on the plan view drawings (E1-4400 Series). Please identify the location of Dimming Panel EDMH-2-B-EMG.	Please refer to response to QBD TG10.4-563.
TG10.4-565	8/29/2014	TE1-2602 & SE1-2602	27 00 00 & 28 00 00	The door at column line 1-D on the security drawing shows this door as requiring a door contact. The telecom drawing then should show the conduit and wire for this door controller, but nothing is shown. In order to determine the project's design intent which drawing takes precedence, SE or TE? Or provide coordinated TE and SE drawings for consistency of equipment, conduit, and cable in order to be able to price a complete system.	The information in the referenced SE and TE-series drawings is accurate and complete. All IP connectivity and associated infrastructure for security is shown on the TE drawings. Door contacts do not require IP connection, therefore no IP outlet is to be shown on TE drawings. Infrastructure requirements for non-IP security devices are provided in the SE details sheets.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-567	8/29/2014	Drawing :E1-4604	26 50 02 , Para: 1.4 (Type E18)(Add 1)(Pg 8	Light Fixture Type E18 is specified as a Deductive Alternate in specification section 26 50 02(1.4)(E18) of the Addendum 1 specs. Please specify which Bid Item this Deductive Alternate is to be associated with.	Fixture E18 is associated with Alternate #17, listed in Specification Section 01 10 30/APD "Schedule of Alternates For MEP", paragraph D.1.9., issued 06/20/14 MEP Addendum 4.
TG10.4-570	8/29/2014	E1-5010(Add1), Detail 1 , 2, 3		Details 1, 2, & 3 on drawing E1-5010(Add1) show the following switchboards being fed from the PG&E vault with conduit only: RMS-B1-A, RMS-B1-B, RMS-B1-C, and MS-FP-B1. Please confirm provision, installation, and termination of feeder wiring for these switchboards in not to be included in Bid Package TG10.4.	TG10.4 Trade Subcontractor is to supply and install conduit with pull string. SFPUC is to supply and install feeder wiring.
TG10.4-572	8/29/2014		27 05 24 Para: 3.3. D	Is the intent of this specification statement "...from the TGB ground bar in each of the IDF rooms to the TGMB ground bus in the MDF room." to have an individual ground run from each IDF room to the MDF room or in and out from each IDF room with the end point being in the MDF room?	Please see attached sketch TSK-0047 for an illustration of the bonding system.
TG10.4-573	8/29/2014	E1-4302, 4303, 4304	26 09 33 Para: 1. 3. A. 4 a.	The retail spaces shown on E1-4302, 4303, 4304 and similar locations, show having lighting control devices in each retail space; please confirm these lighting control devices are to be furnished and installed with final connection to the central lighting control system by the future tenant. Note: as shown currently there are no light fixtures to control or panels to connect.	Confirmed, the photocells and occupancy sensors shown in the retail spaces on the Ground Floor and Second Floor are to be furnished and installed with the final connection to the central lighting control system by the future tenant. Refer to plans for current provisions for temporary emergency lighting. Switched fixture F6 and illuminated exit signs are connected to emergency circuit via emergency dimming panel as described on drawings E1-4302, 4303 and 4304.
TG10.4-586	9/3/2014		28 23 00 Video Surveillance, Paragraph(s): 2.3.A.7 Exterior CCTV Camera Enclosure - a / b / c	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-587	9/3/2014	SE1-3001	28 23 00 Video Surveillance, Paragraph(s): 2.2 Video Analytics System (VAS)	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-588	9/3/2014	SE1-3001	28 23 00 Video Surveillance, Paragraph(s): 2.1.D.7 Standby Archiver	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-595	9/5/2014	E1-2202		The Fire Alarm Strobe layout as shown on Electrical drawing fail to meet CBC 907.5.2.3.1 requirements in certain areas. Should the contractor add required strobes in pricing or should the pricing only include devices shown on drawings?	Yes, TG10.4 Trade Subcontractor is to include devices as required to meet code for all occupied spaces. Specification Section 28 30 02 is performance based.
TG10.4-601	9/5/2014		28 23 00, PG 34, Para: 6 - USP Capacity	Specification Section 28 23 00 Video Surveillance, page 34, paragraph 6 USP Capacity, b. The USP shall be capable of storing 30 days of archived video from all cameras. Please provide the following information to assist in the required storage space: Codec, resolution, frames per second, compression, and hours of recording for each camera.	Calculate storage using maximum allowable resolution for each specified camera; frames per second for the areas described in Specification Section 28 23 00 paragraph 2.1, A, 2; H.264 compression codec; continuous recording.
TG10.4-602	9/5/2014		28 23 00, PG 16, 17, & 18	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

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TG10.4-604	9/8/2014	SE1-2203(SKS-1007)		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-605	9/8/2014	SE1-2205 (SKS-1009)		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-606	9/8/2014	SE1-2250 (SKS-1013)		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-607	9/8/2014	SE1-6302 (SKS-045)		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-608	9/8/2014		SE1-4000, detail 12, Note 11	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document / Spec. No.	Question	Response
TG10.4-609	9/8/2014		SE1-4003, Detail 6 (corresponds to AC10)	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section: 2.2 Video Analytics
Drawing Sheet:
Date: August 18,2014
Paragraph(s): 2.4 Option
Detail(s): A. Camera Resident Video analytics

Proposed Substitution: Agnet Vi
Manufacturer/Address/Phone: Agent Video Intellignce 405 Lexington Av., 26th Floor, New York, NY 101
Trade Name/Model No.: savVi Version 5.0

Product History: ☐ New ☐ 2-5 years old ☐ 5-10 years old ☑ More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

Agent Vi uses a deterministic rules based analytics engine that achieves similar or superior probability of
to BRS. The BRS system relies on computer generated rules that are unpredictable and computationally
configuration, certainty of performance, and a dramatic improvement in hardware utilization. The net resu

Reason for not providing specified item:

Section 2.1.D.2.o describes a rules/behavior based Video Analytics package as opposed to Section 2.2 which is a
behavioral recognition based Video analytics package. The BRS Labs System specified in Section 2.2 does not explicitly
provide for the list of behaviors listed in section 2.1.D.2.o

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

North Texas Transit Authority 5900 W. Plano Parkway Plano, TX 75093 installed in 2009.
Agent Vi has over 1000 deployments world wide

Proposed substitution affects other parts of the Work: ☑ No ___ Yes: explain

No

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

None

Supporting data attached: ☑ Product Data ☐ Drawings ☐ Test Reports ☐ Samples

☑ Manufacturer's Standard Form of Warranty or Guarantee

Other:_____

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments Agent Vi Data Sheet, Agent Video Intelligence End-User License Agreement

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

Revision	Date
0	August 11, 2014

savVi™ Version 5.0

savVi™ is a unified video analytics software solution that offers a wide variety of analytics functionalities through a single, easy to use platform that integrates with existing or new surveillance systems. Featuring real-time event detection, video search and business intelligence applications, savVi provides a complete solution to the diverse video analytics requirements of multiple vertical markets.

The tables below list the major technical features and functionalities of savVi. The data presented can be used to assist in responses to bids, preparation of proposals or as a general source of information for design purposes.

Product Characteristics Page 2

Management & Administration Page 2

Real-Time Detections & Alerts Page 3

Video Search Page 5

Business Intelligence Page 6

Product Characteristics

Architecture	Distributed analytics, Server analytics
Minimal Hardware Requirements	Intel i5 or comparable CPU, 8GB RAM, 20 GB of free disk space, Graphic card compatible with HD hardware acceleration such as Intel HD Graphics or any of the NVIDIA and ATI Radeon HD cards
Supported Operating Systems	Windows 2012 (64-bit), Windows Server 2008 R2 SP1 (64-bit), Windows 7 SP1 (64-bit)
Supported Databases	MS SQL Server Express Edition (bundled with savVi), MS SQL Server 2012 (Standard and Enterprise editions), MS SQL Server 2008 R2 (Standard and Enterprise editions)
Supported Camera Form Factors	Fixed, PTZ
Supported Camera Sensor Types	Color, Thermal
Supported Cameras & Encoders for Optimized Offering	Axis, Cisco, IQinVision, Verint, Vivotek For complete and up-to-date information on supported devices, click here
Supported Video Management Systems (VMSs)	Cisco, Genetec, Milestone, Verint For complete and up-to-date information on supported VMSs, click here

Management & Administration

Enterprise Grade Features	
Centralized Management	All configuration and setup is performed on a single central server
High Availability	Complete high availability and failover support of all server components
Automatic Set-up & Calibration	Automatic calibration and camera configuration via the Automatic Scene Learning tool (ASL)
Bulk Camera Management	Cameras can be configured as a group
Automatic Camera Discovery	Cameras can be automatically added to the server without manually specifying their IP address
Automatic Mapping to VMS Cameras	Cameras with embedded Vi-Agents can be automatically linked to the corresponding cameras within the VMS
Camera Tampering Detection	
Obscuring	Automatic alert when the video feed is obscured
Camera Shifted	Automatic alert when the camera's field of view (angle) is changed
Saturation	Automatic alert when the saturation of the camera increases to a specified grey level for a specified percentage of the field of view for a specified time period
Low Light	Automatic alert when the light decreases to a specified grey level for a specified percentage of the field of view for a specified time period
Camera Disconnection	Automatic alert when communication with the camera is lost or there is no live video stream
Database	
Redundancy / Failover	Deploy redundant servers to eliminate any single point of failure
Backup & Restore	Ability to backup the database and restore the database from a backup when required
Automatic Archiving	Automatically archives the database and frees space when it reaches a predefined size
API	
Web Service Interface	Offers a web service interface that enables third party video viewing and management applications to integrate with savVi
License Information	

SKU	License	Description
VIRDNT	Redundant Server & VAP License	Redundancy package with failover support for analytics server (per server) and/or VAP

Real-Time Detections & Alerts

savVi delivers highly accurate real-time event detections, eliminating the need to rely on the alertness or response discipline of the surveillance system's operator. Users define potential events of interest in advance and receive alerts when such events occur, enabling rapid responses to incidents, as they emerge.

Licensing Options for Real-Time Detections & Alerts		
SKU	License	Description
SAVRT1	Real-Time Events License – 1 Rule	Enables 1 rule type for real-time events (per camera) – see list of "Real-Time Detection Rules" below
SAVRT2	Real-Time Events License – 2 Rules	Enables 2 rule types for real-time events (per camera) – see list of "Real-Time Detection Rules" below
SAVENT	Real-Time Events License – Enterprise	Enables all rule types for real-time events (per camera) – see list of "Real-Time Detection Rules" below
SAVSET	Real-Time Events License – PTZ Presets	Enables multiple rule types for real-time events on PTZ presets (per camera) – see "Real-Time Detections on Presets" below
SAVPTZ	Real-Time Events License – PTZ Enterprise	Enables multiple rule types for real-time events on PTZ presets and target tracking (per camera) – see "Real-Time Detections on Presets" & "Autonomous Tracking" below
SAVCOR	Real-Time Events + Video Search License – Corporate	Enables all rule types for real-time events and video search (per camera)
Real-Time Detection Rules		
Moving in an Area (Person / Vehicle)		Detects a person / vehicle moving in a predefined area
Crossing a Line (Person / Vehicle)		Detects a person / vehicle crossing a predefined line
Tailgating (Person / Vehicle)		Detects a person / vehicle that crosses a predefined line within a predefined time interval after the person / vehicle that crossed previously
Loitering		Detects a person sojourning inside a predefined area for longer than a predefined time period
Crowding		Detects a crowd if the density of people in a predefined area exceeds a predefined threshold (%) for a predefined time period
Occupancy		Detects a group if the number of people in a predefined area exceeds a predefined threshold (number) for longer than a predefined time period
Stopped Vehicle		Detects a vehicle that stops in a predefined area for longer than a predefined time period
(Vehicle) Speed Analysis		Detects if the average vehicle speed in a predefined area drops below a predefined threshold for longer than a predefined time period
Suspicious Object		Detects a static object that has been left unattended in a predefined area for longer than a predefined time period
Asset Protection		Detects a predefined static object removed or obscured from a camera's field of view for longer than a predefined time period; Up to 20 static objects can be defined in a camera's field of view
Lighting Detection		Detects a light (signal) appearance in a predefined area of the camera's field of view for longer than a predefined time period
Real-Time Detections on PTZ Cameras		
Real-Time Detections on Presets		Enables detections on the following rules on preset positions of a PTZ camera's virtual tour: - Person / vehicle moving in an area - Person / vehicle crossing a line - Stopped vehicle - Suspicious object
Autonomous Tracking		Locks a PTZ camera onto a detected moving target (person / vehicle) by controlling the camera's Pan Tilt Zoom, and tracks that target

Performance	
Number of Rules per Camera	Unlimited
Number of Detected Targets	Unlimited
Number of Detection Areas	Unlimited
Number of Rule Schedules	Unlimited
Rule Management	
Rule Scheduling	Activate / deactivate rules according to predefined schedules
Configurable Rule Parameters	Wide range of advanced parameters to suit various scenarios and environments including: Interval between Events, Camera Type (CCD/Thermal), Masking Level and Video Quality Monitoring settings
Rule Testing & Optimization	Improves the detection and performance of a selected analytics rule by analyzing its previous detections, comparing rule settings and selecting the optimized configuration
Rule Chaining	Ability to create a sequence of detection rules by configuring a specific rule to activate / deactivate other rule/s
Event on Non-Detection	Alert when an activated rule does not detect the target after a specific time threshold
Deploy in Any Environment	All analytics rules can be used both indoors and outdoors
Configurable Sensitivity	Determines the sensitivity of detection according to the physical conditions of the scene; Set to a higher value to improve probability of detection if no events are being generated; Set to a lower value if too many false alarms are being generated

Video Search

savVi boasts automatic and effortless retrieval and analysis of recorded video, replacing cumbersome, labor-intensive, manual searches. Users define parameters regarding the event / object of interest and receive matching search results within seconds, enabling rapid access to specific video segments buried in the stored video.

Licenses for Video Search		
SKU	License	Description
SAVVSQ	Video Search License	Enables video search queries (per camera) – includes all the capabilities listed below
SAVCOR	Real-Time Events + Video Search License – Corporate	Enables all rule types for real-time events and video search (per camera)

Search Criteria	
Camera Selection	Apply search on selected / all cameras
Time Period Specification	Search according to specific time period or recurring time periods
Target Type	Search for specific target type (Person / Vehicle / Static Object)
Target Behavior	Search according to the specific behavior / state of the target

Target Type	Behavior
Person	Moving in an area for a specified duration, Crossing a line, Occupancy, Crowding
Vehicle	Moving in an area for a specified duration, Crossing a line Stopping in a specified area
Static Object	Suspicious object, Asset removed

Target Color	Search according to specific target color
Target Size	Filter according to specific target size
Dwell Time	Search according to interval of dwell time
Similar Targets	Select a vehicle or person and then search for similar looking targets
Search Sensitivity	Controls the tolerance of the search query by selecting the sensitivity level to include / exclude similarities / proximities

Search Results - Viewing Options	
Thumbnails	Displays each search query result in a thumbnail image showing the found target (person / vehicle / object). Users can play back the results. Provides automatic zoom in on the detected target based on the available recorded video resolution.
Video Summary	Displays all search query results in a single clip, as segments, allowing quick review of the video footage for all detected events.
Target Path / Location	Displays the motion paths of found moving targets (persons or vehicles). Alternatively, a graphical overlay is displayed indicating the locations of found targets (static objects) that were added to or removed from a field of view or to / from a predefined area within a field of view. Users can play back each motion path / found target.
Site Map	Visualization of motion data gathered from individual cameras deployed at one site onto a complete site map. By using "Site Map" view, a user can see the "Target Path / Location" on a larger map, showing multiple camera displays in one view.

Search Query / Results Management	
My Queries	Save a search query definition as a preset for future use
My Search Results	Save selected items from the search results for future use
Video Clip Export	Export selected event footage from the search results as an independent video file

Performance	
Number of Cameras for Simultaneous Search	Unlimited
Number of Detected Targets	Unlimited
Number of Detection Areas	Unlimited
Query Time	~5 seconds per camera per 24 hours of recorded video

Business Intelligence

savVi offers automated statistical analysis to present traffic volumes, movement trends and motion patterns, enabling effortless extraction of operational data from surveillance video. Equipped with such information, facility managers, marketing leaders and business owners can make educated decisions regarding various operational and resource allocation aspects at their facility.

License for Business Intelligence		
SKU	License	Description
SAVVBI	Business Intelligence License	Enables business intelligence rule types and generation of statistical information (per camera) – includes all the capabilities listed below
Business Intelligence Rules for Statistical Reports		
Counting (People / Vehicles)		Counts people / vehicles crossing a predefined line (bidirectional), with such data available for extraction to dynamic reports
Speed Analysis (Vehicles)		The vehicle speed data is continuously gathered and available for extraction to dynamic reports
Occupancy (People)		The occupancy information is continuously gathered and available for extraction to dynamic reports
Crowding (People)		The crowding information is continuously gathered and available for extraction to dynamic reports
Query Results – Viewing Options		
Statistics Analysis		Presents graphs showing count results, obtained after performing a search, per camera and / or per timeframe.
Target Path / Location		Displays the motion paths of found moving targets (persons or vehicles). Users can play back each motion path.
Heat Map		Displays visualization of traffic areas ("hot zones") within the camera's field of view. Users can play back each heat map value to show the customer traffic at that location.
Site Map		Projects motion data (pulled from "Target Path / Location" view or "Heat Map" view) from individual cameras at one site onto a complete site map.

The tables above refer to the product version specified at the beginning of this document, and do not contain the full features and functionalities of savVi, or design aspects that may affect or limit some of the features or functionalities. Additional information is available on Agent Vi's website www.agentvi.com, including in the savVi Product Brochure, or in Agent Vi's extended documentation and manuals which are available to Agent Vi's partners. For specific queries, please contact sales@agentvi.com

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Agent Video Intelligence

Attn: Agent Vi Legal Counsel
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00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section:	27-41-17	Date:	August 18, 2014
Drawing Sheet:	2.5	Paragraph(s):	A, B, C, D
		Detail(s):	Video Modular Matrix

Proposed Substitution: Galileo Digital Video and Application Processor

Manufacturer/Address/Phone: RGB Spectrum, Alameda, CA 510-263-0601

Trade Name/Model No.: Galileo GO-56-E5

Product History: ☑ New ☐ 2-5 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

See attached. Galileo is a replacement for both the digital matrix switch and the well processor. It also can provide control functions replacing a control system.

Reason for not providing specified item:

Price, simplicity and expanded capability.

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

Lockheed Martin installation for Navy Surface Warfare Demo Center; Facebook corporate security center.

Proposed substitution affects other parts of the Work: ☑ No ☐ Yes: explain

Enables full IP, or digital video architecture. May eliminate the need for additional PC systems.

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

Supporting data attached: ☑ Product Data ☐ Drawings ☐ Test Reports ☐ Samples

☐ Manufacturer's Standard Form of Warranty or Guarantee

Other: Demonstration available at RGB Spectrum Headquarters, Alameda CA

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments Technical reference manual; CSI specification; data sheet.

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

Revision	Date
0	August 11, 2014

SECTION 27 41 16 - Audiovisual Systems and Equipment

INTEGRATED AUDIO-VIDEO SYSTEMS AND EQUIPMENT

Specifier: The Specifier/Design Professional is responsible for the accuracy of all project specifications, including system application and coordination with related sections. This guide specification is provided as a convenience and may require editing to match actual project requirements. RGB Spectrum shall not be liable for any damages arising out of the use of any of its guide specifications.

For design assistance and/or design review, please contact RGB Spectrum Technical Support at (510) 814-7000, Option 1, or email tech@rgb.com.

Basis-of-Design Product: Galileo 12 / 32 / 56 Display Processor

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PART 1 GENERAL

1.1 SECTION INCLUDES

A. A controllable PC-based real-time display processor that accepts digital, analog and/or IP inputs and provides unlimited windowing capabilities.

B. Remote hardware adapters that enable remote desktop capabilities.

C. Simplified user GUI that offers live thumbnails of sources and drag-and-drop operation.

PART 2 PRODUCT(S)

A. The product is a PC-based real-time display processor with up to fifty-six (56) digital or up to two hundred and seventy-six (276) analog direct input channels; fifty-six (56) direct outputs; and the ability to decode and display up to sixteen (16) high-resolution IP inputs (or more at lower resolutions).

B. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products of RGB Spectrum, Alameda, CA 94501, phone (510) 714-8000, FAX (510) 814-7026 [or comparable products from a single manufacturer approved by Architect prior to bidding], with the following components and characteristics.

2.1 SYSTEM ARCHITECTURE — THE SYSTEM SHALL BE COMPOSED OF THE FOLLOWING ELEMENTS:

A. The display processor shall incorporate a real-time driver to prevent image tearing when processing high resolution content across up to 56 outputs.

B. The display processor shall have the ability to run PC-based applications (i.e. VMS, SCADA, video-conferencing) natively on the video wall.

C. The display processor shall accept IP inputs natively without additional hardware.

1. The processor shall accept many IP camera/video inputs and decode/display up to sixteen (16) 1080p30 IP camera/video inputs or a greater number of lower resolution streams without image tearing artifacts.

2. The processor shall accept IP inputs in a range of formats including H.264, MPEG2, MPEG4 and MJPEG.

D. The display processor shall be compatible with remote hardware adapters that enable remote desktop capabilities.

E. The display processor shall accept up to fifty-six (56) digital direct video inputs, two hundred and seventy-six (276) analog direct inputs, or a combination thereof depending on the input cards selected.

F. The display processor shall be able to configure an unlimited number of inputs or applications in windows of any size and located anywhere on the video wall.

G. A single display processor chassis shall be able to support video wall arrays of up to fifty-six (56) display devices arranged in any horizontal, vertical or rectangular configuration.

H. The display processor shall enable video wall display devices to be arranged in portrait or landscape orientation.

I. The display processor shall provide a range of control options: basic user GUI, advanced user GUI, tablet interface, a scripting interface, telnet and serial control.

2.2 GALILEO PROCESSING

A. Basis-of-design Product(s): Galileo 12 / 32 / 56 Display Processor

Depending on system requirements, choose a display processor with appropriate input and output capabilities. Galileo processor capabilities are summarized by model in the following chart:

Processor	Chassis	Max Inputs	# of Windows	Max Outputs	Max Displays
Galileo 12	2RU	12 digital or 52 analog	Unlimited	12	12
Galileo 32	5RU	32 digital or 148 analog	Unlimited	32	32
Galileo 56	5RU	56 digital or 276 analog	Unlimited	56	56

A. Chassis

1. The processor shall have a rugged, stand-alone 2RU (Galileo 12) or 5RU (Galileo 32 / Galileo 56) steel chassis.

2. The chassis shall be fan cooled, with user washable/replaceable filters.

3. The chassis shall have mounting holes for a standard 19” rack.

B. Input Capacities

1. The display processor shall support the display of up to fifty-six (56) digital inputs or two hundred and seventy-six (276) analog inputs (or a combination of digital and analog inputs), and up to 16 IP inputs (1080p30; more at lower resolutions).
    a. Each input shall be routable to an associated window on the display wall.
2. The display processor shall have a modular system of inputs.
3. Modular input cards for the display processor shall be available in 2-channel, 4-channel, 8-channel (analog only) or 16-channel (analog only) formats.
4. A variety of modular cards shall enable the display processor to support a range of input and output signal types.
5. The display processor's input modules shall be available in the following three (3) formats:
    a. DVI/HDMI
    b. Analog
    c. 3G/HD-SDI
6. The display processor shall support input video resolutions up to 1080p for SDI and 1920x1200 for DVI/HDMI.
7. The display processor shall be able to accept computer resolutions up to 3840x2160p15 (4K).
8. The display processor shall support all VESA-compatible timing formats for analog and digital inputs.
9. The display processor shall enable direct and computer application inputs to be selected and controlled via the system's graphical user interface.
10. The display processor shall enable the free rotation of all input signals.

C. Output Capacities

1. The processor shall provide up to fifty-six (56) DVI/HDMI or VGA output connections.
2. The display processor shall support output resolutions up to 2560x1600p30 (DVI/HDMI) and 2048x1536p60 (VGA).
3. The display processor shall support all VESA-compatible timing formats for analog and digital outputs.
4. The display processor shall have a modular system of outputs.
5. Modular output cards for the display processor shall be available in 2-channel or 4-channel formats.
6. Each of the display processor's fifty-six (56) output connectors shall support one (1) display device.
7. The display processor shall output signals to video wall arrays of up to fifty-six (56) display devices, arranged in any horizontal, vertical or rectangular

configuration.

8. The display processor shall output signals to video wall display devices with either portrait or landscape orientation.
9. The display processor shall support HDCP encryption on any number of inputs and outputs on up to fifty-six (56) display devices.

D. Real-time Performance Capabilities

1. The display processor shall incorporate a real-time driver to ensure that HD content is processed and displayed with no image tearing artifacts.
2. The display processor shall maintain full frame rate capability for all windows simultaneously, including high definition video and graphics, regardless of the input resolution or frame rate of the source.

E. PC System Capabilities

1. The display processor shall have either an Intel® Core i7 or dual Intel Xeon E5 CPU.
2. The display processor shall provide between 8 GB DDR3 to 32 GB DDR3 of internal memory.
3. The display processor shall incorporate a 500 GB solid state drive for enhanced reliability.
4. The display processor shall provide a RAID option for redundancy.

F. Window and Image Manipulation Capacities

1. The display processor shall be able to configure and display an unlimited number of windows on the video wall.
2. The display processor shall be able to display any direct input (analog or digital), IP input, or PC application in a single window or duplicated in multiple windows on the video wall.
3. The display processor shall be able to stretch windows both horizontally and vertically to any aspect ratio.
4. The display processor shall be able to maintain the input source's aspect ratio when resizing the associated window.
5. The display processor shall be able to independently position windows anywhere on the display wall, including across mullions (monitor bezels), and scale inputs to any size.
6. The display processor shall provide dynamic scaling, pan and zoom capabilities for every window.
7. The display processor shall enable the free rotation of all inputs.
8. The display processor shall be able to move windows on or off screen.
9. The display processor shall provide move-to-nearest-edge and lock-in-place capabilities for every window.
10. The display processor shall support transitions and animations for live video

windows.

11. The display processor shall enable color keying on input sources.
12. The display processor shall be able to independently adjust color, brightness, contrast and sharpness for each window.
13. The display processor shall be able to overlap windows.
14. The display processor shall be able to compensate for monitor mullions (bezels), and provide negative mullion compensation to account for projector edge blending.
15. The display processor shall allow users to save preferred window layout configurations as presets for easy recall.
16. The display processor shall provide a comprehensive scripting interface to program and edit window layouts, animations and transitions.

G. System Control Capabilities

1. The display processor shall provide a browser-based graphical user interface (GUI) to simplify operation of the system.
2. The display processor's GUI shall provide a representation of the video wall array and allow users to "click and drag" to display inputs and applications as well as change window positioning and sizing.
3. The GUI shall enable user profiles/custom access settings for multiple users to allow/restrict access to system functions.
4. The GUI shall provide a customizable log of events (including user) related to system control, window configuration and layouts, script modification, etc.
    a. The system administrator shall be able to select which types of events are logged.
    b. The event log shall identify which user was responsible for each event.
5. The display processor shall provide a scripting interface.
    a. The scripting interface shall be able to control the functions of the display that can be used to control both the processor and external third-party devices.
6. The display processor shall enable telnet or serial control of the system.
7. The display processor shall offer the option of control though a tablet interface.
8. The display processor GUI shall provide an API to enable system control through third-party devices.
9. The display processor shall be able to schedule and recall scripts and layouts over a specific duration which can be set in seconds, minutes, hours, days, and/or weeks, and be able to repeat this script on a regular schedule.

H. Power Supply

1. The display processor shall utilize dual redundant power supplies.
2. The display processor's power supplies shall be hot-swappable.

3. Depending on the model, the display processor shall utilize a maximum of 600W (Galileo 12), 1000W (Galileo 32), or 1485W (Galileo 56).

I. Supported Resolutions / Timings

1. The display processor shall support video resolutions up to 1920 x 1080p60 for SDI and 1920x1200p60 for DVI/HDMI.
2. The display processor shall be able to accept computer resolutions up to 3840x2160p15 (4K).
3. The display processor shall support all VESA-compatible timing formats for analog and digital inputs and outputs.

J. Physical Specifications

1. 2RU Chassis (Galileo 12):
   a. Size (h x w x d): 3.5” x 19.0” x 15.0” (8.9 x 48.3 x 38.1 cm)
   b. Weight: 26 lb / 11.8 kg
   c. Power: 100-240 VAC, 50/60 Hz; dual-redundant power supplies
   d. Power consumption (max): 600W
   e. Operating temperature range: 0-50^{o}C
   f. Operating humidity: 20% to 80% non-condensing
2. 5RU Chassis (Galileo 32/56):
   a. Size (h x w x d): 7.0” x 19.0” x 20.0” (17.8 x 48.3 x 50.8 cm)
   b. Weight: 35 lb / 15.9 kg
   c. Power: 100-240 VAC, 50/60 Hz; dual-redundant power supplies
   d. Power consumption (max): 1000W (508) / 1485W (514)
   e. Operating temperature range: 0-50^{o}C
   f. Operating humidity: 20% to 80% non-condensing

2.3 REMOTE DESKTOP CAPABILITIES

A. Basis-of-design product(s): RGB Spectrum’s VDA Remote Desktop Adapters (herein referred to as remote hardware adapters).

B. The display processor shall be compatible with remote hardware adapters that enable remote desktop capabilities.

1. Using remote hardware adapters, the display processor shall be able to input and display signals from remotely located computers and equipment over a LAN and/or WAN.
2. Remote hardware adapters shall provide operators with low latency KVM control over remote systems and equipment.
3. Remote hardware adapters shall enable remote control of source computers and equipment over a LAN and/or WAN.
4. Remote hardware adapters shall extend shared KVM control to all connected local and remote source computers.
5. Remote hardware adapters shall encode video signals and keyboard and

mouse control commands using AES 256-bit encryption and NSA Suite B cryptography to provide secure transmission of signals over network connections.

6. Remote hardware adapters shall utilize adaptive compression technology to optimize encoding, transmission and decoding of all content types (including 3D graphics, video, animation, and text) at any available bandwidth.
7. Remote hardware adapters shall enable the contents of the video wall to be encrypted and sent to remote destinations for viewing.
8. Remote hardware adapters shall enable video and graphics transmission at 1 Mbps.
9. Remote hardware adapters shall enable operators at multiple sites to work collaboratively and share control of system resources.

2.4 SIMPLIFIED USER GUI

A. Basis-of-design product: RGB Spectrum's VIEW Controller for Galileo

B. General

1. The simplified user GUI shall provide users with an enhanced interface that streamlines system operation.
    a. The GUI shall be used to operate all components of the video wall system.
    b. The GUI shall display live thumbnail images, as selected, of each source computer's output.
    c. The GUI shall provide live previews of selected sources.
    d. The GUI shall allow users to select thumbnail images and "drag and drop" to assign them to one or more of the video wall processor's outputs.
    e. The GUI shall allow users to "drag and drop" sources to auxiliary displays.
    f. The GUI shall allow users to recall preset signal routing configurations.
    g. The simplified user GUI shall be designed to restrict user access to the set-up/admin functionality of the controller.
    h. When multiple operators access the system, the GUI shall support a control arbitration scheme based on permissions and priorities (set by the administrator) to determine a user's level of access to system resources.

END OF SECTION

NEW

Galileo Display Processor

High Performance PC-based Video Wall System

Overview

RGB Spectrum is well-known for its purpose-built video wall solutions. The new Galileo™ Display Processor adds the benefits of a PC-based system, including IP inputs and the ability to run applications, while maintaining the 24/7 reliability and real-time performance of all of RGB Spectrum's solutions.

A Breakthrough in PC Walls

The Galileo display processor sets a new standard for PC-based video walls, with enhanced performance and reliability:

Proprietary Driver

This enables the system to deliver real-time throughput and superb image quality, unlike other PC-based systems that can drop frames or cause image tearing.

Input Flexibility

The system accepts a full range of signal types including IP, analog, DVI/HDMI and/or 3G-SDI, and supports resolutions up to 3840x2160 (4K).

Robust HDCP

The processor's HDCP handling prevents screen flashing and delivers HDCP protected content to up to 56 displays. Other PC-based systems either do not support HDCP at all or impose severe limitations on wall size.

Enhanced Reliability

The processor's solid state drive and dual-redundant power supplies add an extra level of reliability.

Key Features

- IP camera/video compatibility (MPEG2, MPEG4, MJPEG and H.264)
- Inputs up to 3840x2160 (4K)
- Advanced remote desktop technology
- Up to 56 inputs and 56 displays
- Real-time processing
- Bezel compensation and edge-blending
- Dynamic scaling, panning and zooming
- Scripting interface for system control
- Transitions and animations
- HDCP support across all outputs
- Tablet-based control interface

IP and Remote Desktop Support

The Galileo processor supports H.264 decodes for motion video. In addition, our exclusive VDA™ remote desktop technology, with integrated KVM capabilities, provides operators with low-latency control of remote systems via a LAN or WAN. System performance is demonstrably superior to the industry standard VNC, particularly at low bandwidth or with high motion graphics and video.

Advanced User GUI

The Galileo system is easy to set-up and control. An advanced GUI allows users to “drag and drop” inputs and applications, such as VMS, SCADA, and videoconferencing, to the video wall. A convenient tablet interface is also available.

An API allows operators to monitor remote alarms and create advanced scripts to recall layouts and control third-party equipment.

Experience the Power

RGB Spectrum’s new PC-based Galileo display processor combines enhanced reliability with the flexibility of a PC system. It’s ideal for a range of applications, from mission-critical control rooms and operations centers to spectacular boardroom and lobby video wall displays. With its real-time processing, powerful features and input flexibility, the new Galileo display processor is **a PC wall done right.**

Specifications

	Model 201	Model 401	Model 501
Inputs			
Format	2-ch, 4-ch, 8-ch, 16-ch (modular)	2-ch, 4-ch, 8-ch, 16-ch (modular)	2-ch, 4-ch, 8-ch, 16-ch (modular)
Signal Type	DVI/HDMI, 3G-SDI, Analog	DVI/HDMI, 3G-SDI, Analog	DVI/HDMI, 3G-SDI, Analog
Maximum	12 digital, 48 analog	40 digital, >100 analog	56 digital, >100 analog
Outputs			
Format	2-ch, 4-ch (modular)	2-ch, 4-ch (modular)	2-ch, 4-ch (modular)
Signal Type	DVI/HDMI, Analog	DVI/HDMI, Analog	DVI/HDMI, Analog
Maximum	12	40	56
Processor			
CPU	Intel® Core™ i7 or Dual Intel® Xeon® E5		
Memory	16 GB, DDR3		
Hard Disk	500 GB - 1000 GB Solid State Drive (SSD)		
Physical			
Size (H x W x D)	3.5 x 19.0 x 15.0 inches (2RU)	7.0 x 19.0 x 20.0 inches (4RU)	8.75 x 19.0 x 23.0 inches (5RU)
	89 x 483 x 381 mm	178 x 483 x 508 mm	222 x 483 x 584 mm
Weight	26 lbs/11.8 kg	35 lbs/15.9 kg	49 lbs/22.2 kg
Environmental			
Power Supply	100-240 VAC; 50/60 Hz, 400 W max	100-240 VAC; 50/60 Hz, 800 W max	100-240 VAC; 50/60 Hz, 1100 W max
	Dual redundant	Dual redundant	Dual redundant
Operating Temp.	+32 to +122 °F (0 to +50 °C)	+32 to +122 °F (0 to +50 °C)	+32 to +122 °F (0 to +50 °C)
Storage Temp.	-40 to +158 °F (-40 to +70 °C)	-40 to +158 °F (-40 to +70 °C)	-40 to +158 °F (-40 to +70 °C)
Humidity	10% to 90%, non-condensing	10% to 90%, non-condensing	10% to 90%, non-condensing
Certifications	UL, CE, CCC, FCC, NERC/CIP	UL, CE, CCC, FCC, NERC/CIP	UL, CE, CCC, FCC, NERC/CIP

Specifications subject to change.

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RGB SPECTRUM
VISUAL RESOURCE MANAGEMENT™

Galileo™ Display Processor Technical Reference Guide

Installation and Configuration

RGB Spectrum
950 Marina Village Parkway
Alameda, CA 94501

DOCUMENT

- Galileo Display Processor Technical Reference Guide
- P/N 350-11606-01 v1.0
- August 2014

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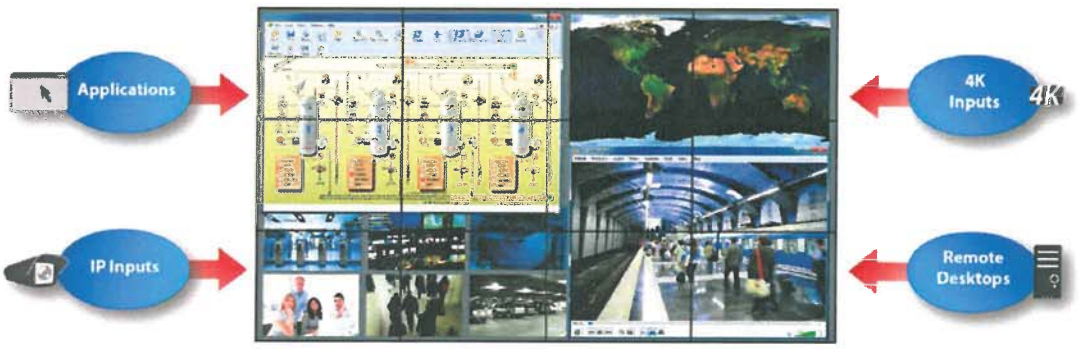
CHAPTER 1

INTRODUCTION

The innovative Galileo Display Processor is a powerful and economical video wall control system with remote desktop capabilities designed around a PC-based architecture. The video wall processor adds the benefits of PC-based systems, such as IP inputs and the ability to run applications natively, to the 24/7 level of reliability and real-time performance of all of RGB Spectrum's solutions.



The Galileo system supports a full range of input and output types (IP, analog, DVI/HDMI, 3G/HD-SDI) with input resolutions up to 3840 × 2160/15 (4K). The video wall processor can also deliver HDCP-protected content to up to 56 displays, while other PC-based systems either do not support HDCP at all or impose severe limitations on video wall size.

A proprietary driver enables the Galileo Display Processor system to deliver real-time throughput and superb image quality, unlike other PC-based systems that can drop frames or cause image tearing. The video wall controller's solid state drive and dual-redundant power supplies add an extra level of reliability.

Galileo supports H.264 IP decodes for motion video. In addition, our exclusive VDA remote desktop technology with integrated KVM over IP capabilities provides operators with low-latency control over remote systems via a LAN or WAN. VDA remote desktop performance is demonstrably superior to the industry standard VNC, particularly at low bandwidth or with high-motion graphics and video.

Galileo is easy to set up and control. Its advanced GUI allows you to "drag and drop" inputs and applications, such as VMS, SCADA and videoconferencing, to the video wall. For details on this interface, refer to the *Galileo Video Wall Control Software User's Guide*. In addition, an API allows operators to monitor remote alarms and create advanced scripts to recall layouts and control third-party equipment. A convenient tablet interface is also available.

The Galileo Display Processor is ideal for a range of applications including mission-critical operations centers, command centers and control rooms, as well as boardroom video walls, corporate lobby displays, and large-scale digital signage. Combining enhanced reliability with the flexibility of a PC system, the new IP-enabled Galileo Display Processor is a PC wall done right.

1.1 Key Features

- IP camera/video compatibility (MPEG2, MPEG4, MJPEG and H.264)
- Inputs up to 3840 × 2160/15 (4K)
- Advanced remote desktop technology
- Up to 56 displays
- Real-time processing
- Bezel compensation and edge blending
- Dynamic scaling, panning and zooming
- Scripting interface for system control
- Transitions and animations
- HDCP support across all outputs
- Tablet-based control interface

1.2 System Overview

The Galileo Display Processor system consists of the following hardware and software components.

1.2.1 Hardware

BASE PLATFORM

The Galileo hardware platform is a rack-mount computer available in two sizes, 2RU (3.5 in. high) and 5RU (8.75 in. high).

The 2RU chassis houses two (2) power supplies, solid state drive (SSD), backplane, and motherboard that accepts a single-board computer (SBC) and up to four (4) input/output (I/O) cards.

The 5RU chassis houses two (2) power supplies, SSD, and backplane that accepts a single-board computer (SBC) and up to 17 I/O cards.

Table 1-1 lists the available Galileo base system configurations.

Table 1-1 Galileo Base System Configurations

Model Number	Chassis Height	Maximum Output Count (Note 2)	Processor	Available I/O Card Slots	
				Digital	Analog
GO 12	2RU	12	Intel® Core™ i7	3	1
GO 12-E5			Dual Intel® Xeon® E5		
GO 32	5RU	32	Intel® Core™ i7	8	2
GO 56		56		14	3
GO 32-E5		32	Dual Intel® Xeon® E5	8	2
GO 56-E5		56		14	3

Notes:

1. All base configurations include 8 GB of RAM, a 500 GB SSD, the Galileo Server software and a single-user Galileo Client software license.
2. The number of installed I/O cards determines the output count. **Base configurations do not include I/O cards.** These must be purchased separately.

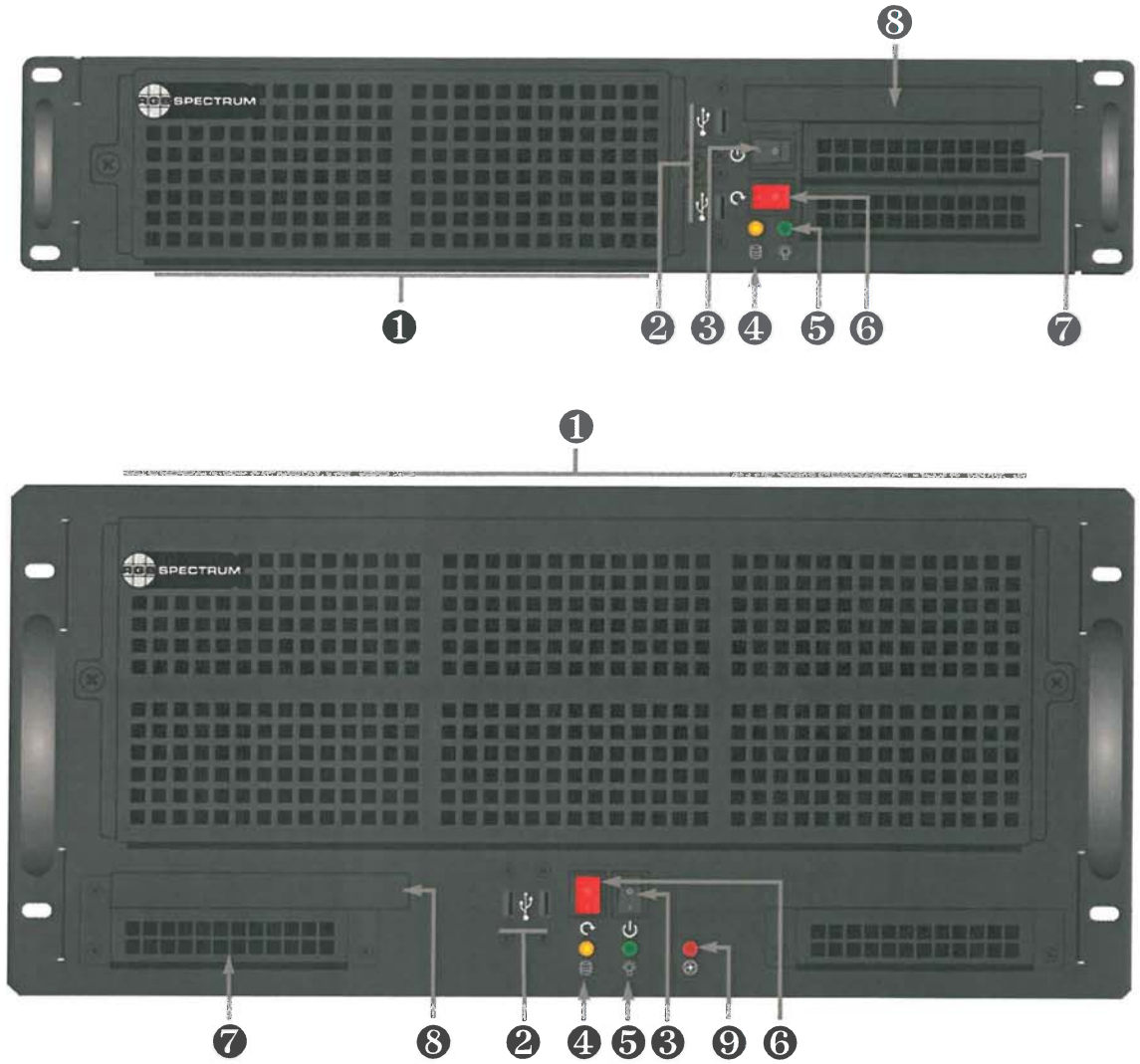


Figure 1-1 Galileo 2RU and 5RU Chassis – Front View

1. **Air Intake Vents and Filter**

   Fans behind these vents draw cool air into the chassis. To ensure adequate air flow and maintain a proper operating temperature, provide a minimum of 4 to 6 inches (101 to 152mm) of free air space around the chassis.

   To prevent overheating the Galileo Display Processor, check the front panel filter once a month. If the Galileo is used where dust and dirt are an issue, it is recommended that you inspect the filter more frequently.

2. **USB Ports**

   Two USB 2.0 ports are provided on the front panel for connecting a keyboard, mouse or other USB device.

3. **Power Switch**

   Use this switch to turn the display processor on or off.

4. **Drive Activity LED**

   Blinks yellow to indicate that data is being written to or read from the SSD.

5. **Power Status LED**

   Lights green to indicate that adequate power is being provided to the system.

6. **System Reset Switch**

   Press and momentarily hold this switch to reset the display processor.

7. **Drive Bay**

   A 3.5-inch bay housing the SSD. A second SSD and RAID support are available as options.

8. **Optical Drive Bay (empty)**
9. **Fan Status LED**

   Lights red to indicate a failure of one or more system fans.

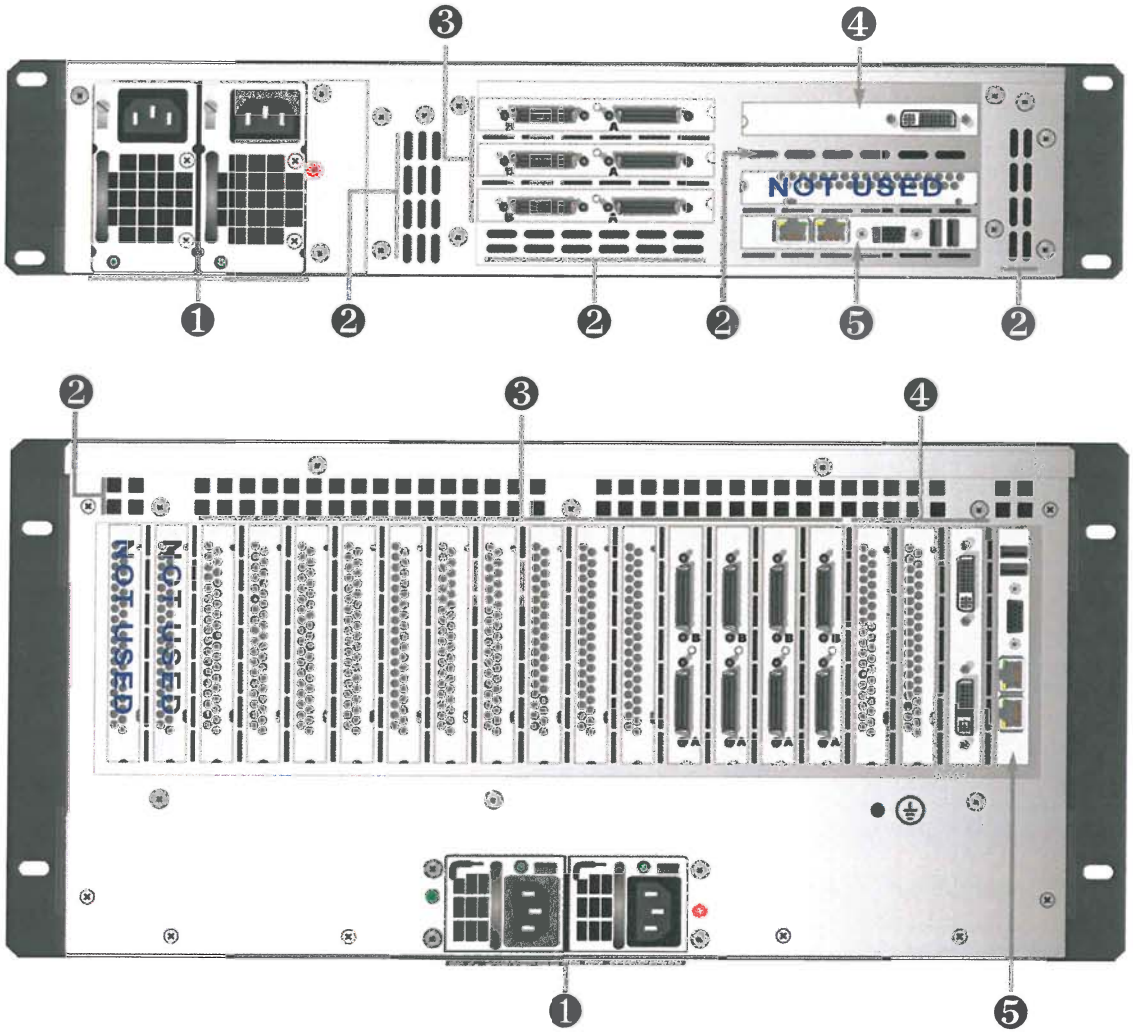


Figure 1-2 Galileo 2RU Chassis and 5RU Chassis – Rear View

1. **Power Supplies**

   Connect both power supplies to AC power sources to provide redundancy should one of the power supplies fail.

2. **Exhaust Vents**

   Warm air exits the chassis through these vents. To ensure adequate air flow and maintain a proper operating temperature, provide a minimum of 4 to 6 inches (101 to 152mm) of free air space around the chassis.

3. **Digital (PCIe ×16) I/O Card Slots**
4. **Analog I/O Card Slots**

Note The GO 32 and GO 32-E5 5RU chassis models are identical to that shown in Figure 1-2, but have eight (8) digital and two (2) analog card slots.

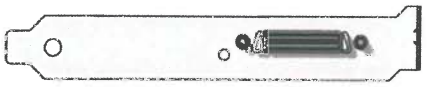
5. **Single-Board Computer (SBC)**

   The SBC is the heart of the Galileo Display Processor system. It contains the CPU, RAM and other system components, and provides two 10/100/1000BaseT Ethernet ports and two USB 2.0 ports. (The VGA output cannot be used.)

INPUT AND OUTPUT CARDS

Table 1-2 lists the available I/O cards for Galileo.

Table 1-2 Galileo I/O Cards

	Model Number	Inputs (number × type)	Outputs (number × type)	Included Cables (refer to Table 1-3)
	GO D44	4 × DVI/Analog (RGB, YPbPr, S-Video or Composite)	4 × DVI/VGA	2 × GO ACD4
	GO D24	2 × DVI/Analog (RGB, YPbPr, S-Video or Composite)	4 × DVI/VGA	1 × GO ACD4 1 × GO ACD2
	GO D04	None	4 × DVI/VGA	1 × GO ACD4
	GO A08	8 × Analog (S-Video or Composite)	None	1 × GO ACA8
	GO A16	16 × Analog (S-Video or Composite)		2 × GO ACA8
	GO S22	2 × 3G-SDI	2 × DVI/VGA	1 × GO ACD2

CABLES AND ACCESSORIES

Table 1-3 lists the available cables and accessories for Galileo.

Table 1-3 Galileo Cables, Accessories, Upgrades, and Replacement Parts

Model Number	Description
GO ACD4	Video Breakout Cable, KX-20 (HDI) male to 4 × DVI female, for Galileo Inputs or Outputs
GO ACD2	Video Breakout Cable, KX-20 (HDI) male to 2 × DVI female, for Galileo Inputs or Outputs
GO ACA8	Analog Breakout Cable, DVI-I male to 8 BNC pairs for Galileo Analog Inputs
GO RS20	20" Rack slide set for Galileo chassis
GO RS24	24" Rack slide set for Galileo chassis
GO GUI	Additional Single-User Client Control Software allowing an additional user to control the same Galileo chassis.
GO SWM	One Year Software Maintenance Agreement fee for years 2 and beyond.
GO HWM	One Year Extended Hardware Warranty for years 2 and 3.
GO D44S	Spare GO D44 I/O Card
GO D24S	Spare GO D24 I/O Card
GO D04S	Spare GO D04 I/O Card
GO A08S	Spare GO A08 I/O Card
GO A16S	Spare GO A16 I/O Card
GO S22S	Spare GO S22 I/O Card

1.2.2 Galileo Software

Galileo Video Wall Control Software consists of three components:

GALILEO SERVER

Galileo Server runs under Microsoft® Windows® 7 Professional (64-bit), on the Display Processor. It starts automatically when Windows starts. Galileo Server manipulates windows and other video wall elements in response to commands it receives from Galileo Client. It also logs system and user activity, and controls access to Display Processor features and functions based on user/group privileges defined by a Galileo Client operator.

GALILEO CLIENT

The Galileo Client can be installed on any Windows PC and controls all aspects of the Video Wall operation. A Galileo base configuration includes a single-user Client license. You may purchase as many additional Client licenses as you require.

Note System Requirements in Chapter 5 describes the hardware and software environment required to run Galileo Client and Galileo Remote Host.

GALILEO REMOTE HOST

Galileo Remote Host runs in the taskbar of any source computer you would like to display on the video wall, and/or control from other clients. The Remote Host has no user interface and cannot be used to control the video wall directly.

1.2.3 Third-Party Software

In addition to the Galileo Video Wall Control Software suite, your Galileo system includes PowerDesk software for configuring your I/O cards according to the requirements of your video wall application.

1.3 Product Specifications

Table 1-4 lists the Galileo Display Processor specifications.

Table 1-4 Galileo Specifications

Parameter	Specification
Inputs	
Format	2-channel, 4-channel, 8-channel, 16-channel (modular)
Signal Type	DVI/HDMI, 3G-SDI, Analog
Resolutions	1920 × 1200 @60 Hz, 2560 × 1600 @30Hz, 3840 × 2160 @15Hz
Capacity (maximum)	**2RU Chassis:** 12 Digital, 48 Analog **5RU Chassis:** 56 Digital, >100 Analog
Outputs	
Format	2-channel, 4-channel (modular)
Signal Type	DVI/HDMI, VGA
Resolution	2560 × 1600 @30Hz
Capacity (maximum)	**2RU Chassis:** 12 **5RU Chassis:** 56
Processor, Memory, Storage and Connectivity	
CPU	Intel® Core™ i7 or Dual Intel® Xeon® E5
Memory	8 GB (2 × 4 GB) DDR3, expandable to 32 GB
Storage	500 GB SSD
USB	4 × USB 2.0 Type A
Network	2 × 10/100/1000 Base-T Ethernet
Power	
Power Supply	Universal 100-240 VAC, 50-60 Hz, dual redundant
Power Consumption (maximum)	**2RU Chassis:** 600 Watts **5RU Chassis:** 1,485 Watts
Environmental	
Cooling	**2RU Chassis:** Three (3), 80mm ball bearing fans, 67 CFM each **5RU Chassis:** Four (4), 92mm ball bearing fans, 102 CFM each

Table 1-4 Galileo Specifications (Continued)

Parameter	Specification
Operating Temperature	+32 to +122 °F (0 to +50 °C)
Storage Temperature	-40 to +158 °F (-40 to +70 °C)
Humidity	10% to 90%, non-condensing
Physical	
Dimensions (h × w × d)	**2RU Chassis:** 3.5 × 19.0 × 18.0* in. (88.8 × 482.6 × 457.2* mm) **5RU Chassis:** 8.75 × 19.0 × 18.0* in. (222.5 × 482.6 × 457.2* mm) * Excludes handles
Weight**	**2RU Chassis:** 23.8 lbs. (10.81 kg) **5RU Chassis:** 34.8 lbs. (15.78 kg) ** Excludes I/O cards and storage
Specifications are subject to change without notice.	

CHAPTER 2 INSTALLATION

This chapter provides installation and initial setup information for the Galileo Display Processor. The following topics are discussed:

- Shipment Contents
- Installation Considerations
- Mounting the Display Processor
- Connections to the Galileo Display Processor
- Applying Power to the Galileo Display Processor

2.1 Shipment Contents

Your Galileo shipment includes the following items:

- Display Processor Chassis, equipped with one or more I/O Cards
- AC Power Cord, 10 ft. (3.05m) (2)
- Cables and adapters for installed I/O Cards, per each of the following card types:
  - GO D04: KX20-to-quad DVI cable, DVI-to-HD15 adapter (4)
  - GO D24: KX20-to-quad DVI cable, KX20-to-dual DVI cable, DVI-to-HD15 adapter (6)
  - GO D44: KX20-to-quad DVI cable (2), DVI-to-HD15 adapter (8)
  - GO A08: DVI-to-16 × BNC cable
  - GO A16: DVI-to-16 × BNC cable (2)
  - GO S22: KX20-to-dual DVI cable, DVI-to-HD15 adapter (2), DIN-to-BNC adapter (2)
- *Galileo Display Processor Technical Resources* CD

2.2 Installation Considerations

Proper installation of your Galileo Display Processor will enhance product performance and extend the life of the product. Consider the following when planning and carrying out your video wall installation.

2.2.1 Ventilation

To ensure adequate air flow and maintain a proper operating temperature, provide a minimum of 4 to 6 inches (101 to 152mm) of free air space around the chassis. Any front cabinet doors or access aisles must accommodate a front chassis clearance of at least 4 inches (101mm) in order to provide proper cable clearances for any front-panel USB port connections, and allow access to the system air filter for maintenance. Ideally, a chassis clearance of 0.5-1.5 inches (13 to 38mm) above the Display Processor is desirable, but not required.

2.2.2 Ambient Heat

Keep the ambient temperature constant and below 35 °C (95 °F). Keep the Display Processor away from heating and/or air conditioning vents.

2.2.3 Ambient Light

In general, minimize or eliminate light sources directed at the video wall. Contrast ratio will be noticeably reduced if light directly strikes a screen, such as when a shaft of light from a window or floodlight falls on the image. Images may then appear washed out and less vibrant.

2.3 Mounting the Display Processor

The Galileo Display Processor can be placed on any flat, stable surface such as a shelf or table, or it can be rack-mounted. Place it in a location that provides easy access to the power connectors.

RGB Spectrum offers an optional Rack Slide Kit for mounting your Galileo Display Processor in a standard, 19-inch equipment rack. The Rack Slide Kit includes the following items:

Table 2-1 Optional Rack Slide Kit Parts List

Description	Quantity
Slide Rail, 20 in. **– OR –** Slide Rail, 24 in.	2
Rail Frame	4
Rail Frame Mounting Bracket (optional)	4
Mounting Hardware:	
• Screw for attaching mounting rail to chassis	10
• Screw for attaching Rail Frame to rack	36
• Nut	10
• Washer	10

To mount the Galileo Display Processor in a standard, 19-inch equipment rack:

1. Confirm that your kit includes all of the items listed in **Table 2-1**.
2. Take one of the Slide Rails and slide the inside section of the rail completely out until you hear an audible click.
3. On the inside of the rail is a rail stop hook. Push the hook up to release and detach the inside section of the Slide Rail completely from the outside section of the rack slide. See **Figure 2-1**.

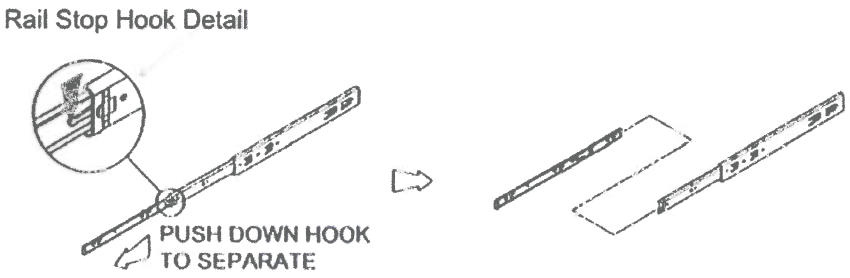


Figure 2-1 Rail Stop Hook Detail

4. Set aside this inside section of the Slide Rail.
5. Repeat Steps 3 and 4 for the other Slide Rail.
6. Using four mounting screws from hardware bag S-047-0, attach an inside Slide Rail section to the left side of the Display Processor chassis, as shown in **Figure 2-2**.

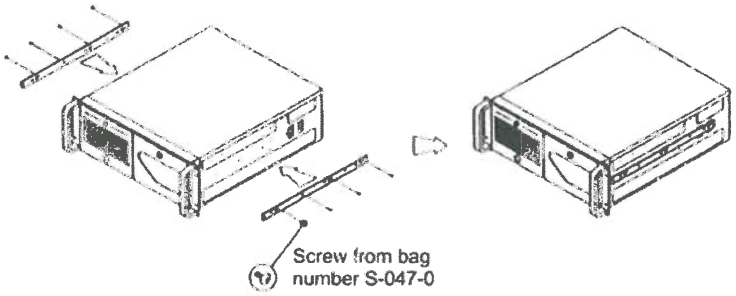


Figure 2-2 Mounting the Inside Rails

Note

The rubber bumper on the inside Slide Rail section needs to face the front of the Display Processor chassis. The cut-out portion of the rail release latch should be pointing downward indicating that the slide rail has been properly mounted to the correct side of the chassis.

7. Repeat Step 6 for the right side of the Display Processor chassis.

Standard 19-inch equipment racks have a wide variety of mounting hole types. Some mounting holes are threaded. Some mounting holes are located on side flanges rather than the front and back of the rack supports. Holes may be either round or rectangular.

The following steps assume that your equipment rack has round, non-threaded mounting holes for the slide rail frames. The optional Rail Frame Mounting Brackets accommodate side-flange rack-mount hole placements. If your rack has other mounting hole types or placements, you may need to consult with your rack supplier to obtain the correct slide rail mounting hardware.

8. The rubber bumper on the outside section of the Slide Rails must face the rear of the equipment rack.

9. Attach two Rail Frames to the outside section of each Slide Rail using the supplied hardware. See **Figure 2-3**.

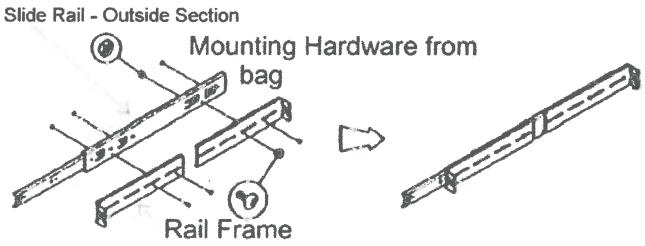


Figure 2-3 Outside Rail and Frame Assembly

10. If the mounting holes are on the inside surface of your rackmount supports, mount each assembly directly to the rackmount supports as shown in **Figure 2-4**.

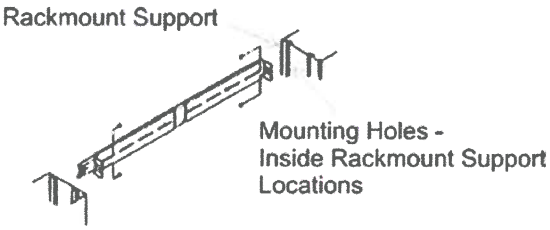


Figure 2-4 Rail Frame Mounting – Inside Rackmount Hole Locations

If the mounting holes are on side flanges, you will need to use the optional Rail Frame Mounting Brackets. Attach the optional brackets to the Slide Rails as shown in **Figure 2-5** and attach the completed assembly to the rackmount supports.

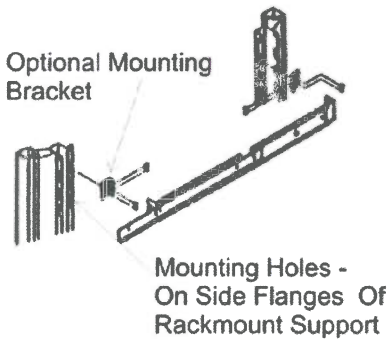


Figure 2-5 Rail Frame Mounting – Side Flange Rackmount Hole Locations

Note You will need to supply the hardware necessary to secure your completed Slide Rail/ Rail Frame assemblies to the rackmount supports.

CAUTION When mounting the completed Slide Rail/Rail Frame assemblies to the rack, ensure that the left and right assemblies are the same distance from the top or bottom of the rack. Failure to align the slide rails properly will result in the Display Processor not being level inside the rack. If the slides are grossly misaligned, you may not be able to slide the chassis into the slide rails.

11. **With the help of an assistant,** lift the chassis and slide the chassis into the rails attached to the rackmount supports. See **Figure 2-6**. You should hear a "click" when the rail stop hooks on the slide engage with the chassis stops inside the rails attached to the rackmount supports.

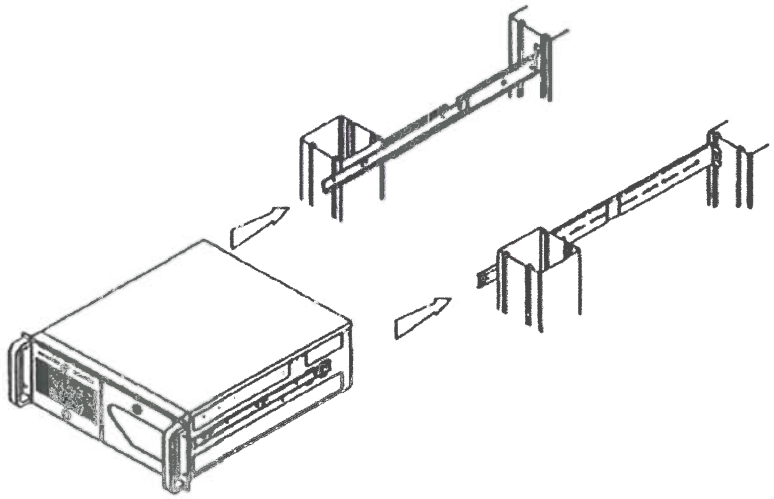


Figure 2-6 Chassis Installation

12. Push up on the rail stop hooks and push the chassis completely into the rack.
13. Each Galileo Display Processor chassis has two through holes on each chassis-mounting flange. Use these holes to secure your chassis to the rackmount supports.

Note You must supply the hardware necessary to secure the chassis to the rackmount supports.

14. Contact RGB Spectrum if you require additional assistance.

2.4 Connections to the Galileo Display Processor

Proceed as follows to connect the Galileo Display Processor to your sources, displays, network and AC power.

Note

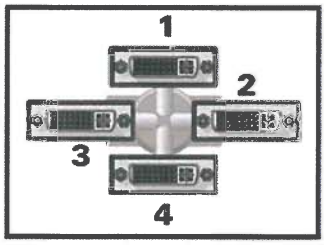
To make some of the connections described in this section, you will need one or more of the following items, in addition to what is provided with your Galileo Display Processor:

- BNC-to-Composite (RCA®) adapter
- BNC-to-S-video adapter
- DVI cable (male-to-male)
- DVI-to-Component adapter
- DVI-to-Composite (RCA) adapter
- DVI-to-S-video adapter

When connecting your equipment:

- **Turn off all equipment** before making any connections.
- Use the correct signal cables for each source.
- For best performance and to minimize cable clutter, **use high-quality cables** that are only as long as necessary to connect two devices. (Don't use a 20-foot cable when a 6-foot cable will suffice.)
- **Ensure that the cables are securely connected.** Tighten the thumbscrews on connectors that have them.

You can connect up to four (4) displays at a time to each Galileo I/O card, depending on the model. Displays are numbered consecutively based on the connector to which each is attached. For example, the monitor attached to the connector labeled **1** on the cable is identified as **1**, the monitor attached to the connector labeled **2** on the cable is identified as **2**, and so on.



Tip

To facilitate the setup of your video wall, we recommend connecting your monitors consecutively and arranging your displays in pairs.

2.4.1 Understanding Your Multi-Card Setup

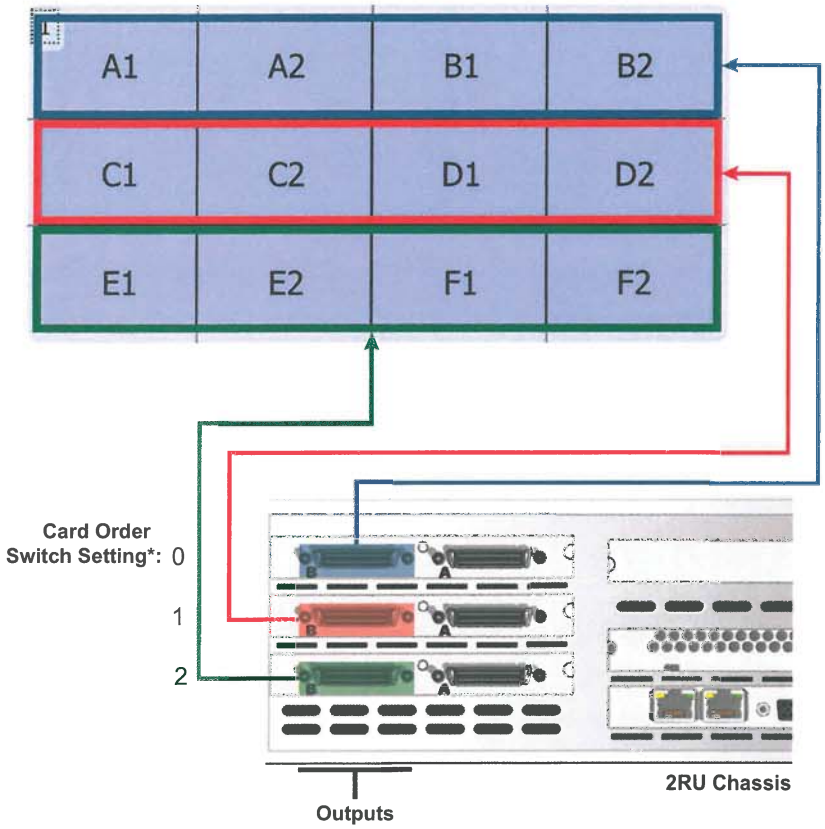
The Galileo Display Processor system includes PowerDesk software, a set of tools for configuring your I/O cards.

When used with Galileo, PowerDesk assigns letters to each Graphics Processing Unit (GPU) on the card and numbers to the outputs associated with that GPU. Quad-output cards (GO D04, GO D24, and GO D44) have two (2) GPUs; the dual-output card (GO S22) has one GPU. The first GPU on the first quad-output card is labeled **A** and its first output is labeled **A1**. The second GPU on the first quad-output card is labeled **B** and its first output is labeled **B1**.

In the examples that follow, only quad-output I/O cards are used.

VIDEO WALL DISPLAY NUMBERING – EVEN NUMBER OF COLUMNS

Figure 2-7 shows a 4 × 3 video wall. In this case, monitors are paired and follow each other sequentially from left to right and top to bottom.

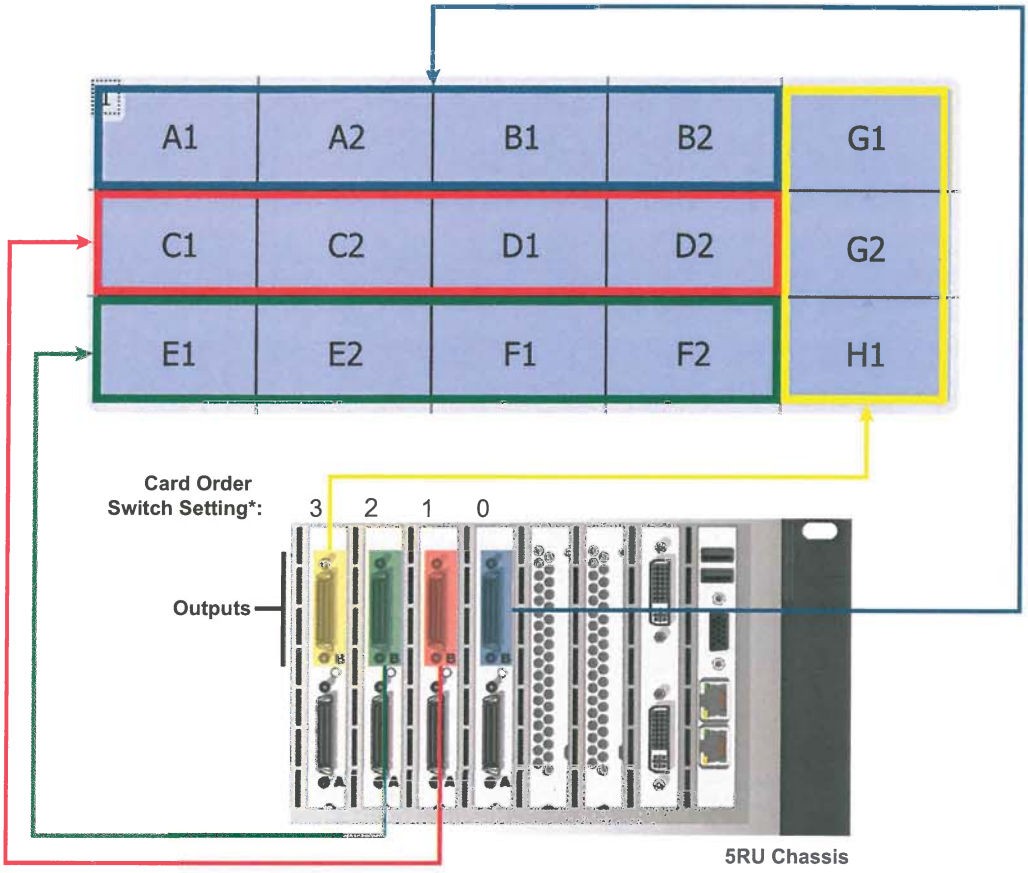


* Factory-configured; starting from 0 and ascending from top to bottom

Figure 2-7 Display Numbering with an Even Number of Columns

VIDEO WALL DISPLAY NUMBERING – ODD NUMBER OF COLUMNS

Figure 2-8 shows a 5 × 5 video wall. In this case, monitors in columns 1 through 4 are paired and follow each other sequentially from left to right and top to bottom. The GPUs associated with the last two cards are placed in the last column of the layout.



* Factory-configured, starting from 0 and ascending from right to left

Figure 2-8 Display Numbering with an Odd Number of Columns

You may need to manually rearrange the outputs of your multi-display layout in PowerDesk to match the physical layout of your video wall.

Chapter 3, Configuring Your Video Wall and I/O Cards, provides detailed instructions for setting up your video wall, changing certain display settings and accessing other PowerDesk features.

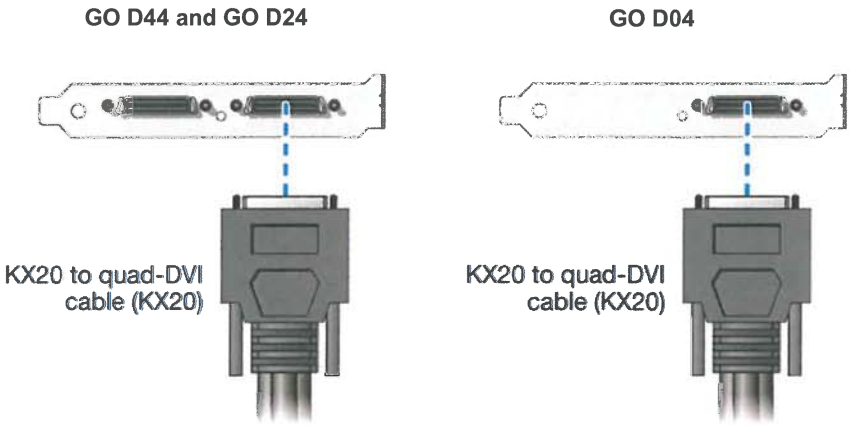
2.4.2 Connections to the GO D44, GO D24, and GO D04 I/O Cards

Proceed as follows to connect your displays and image sources to your GO D44, GO D24 or GO D04 I/O card.

CONNECTING DISPLAYS

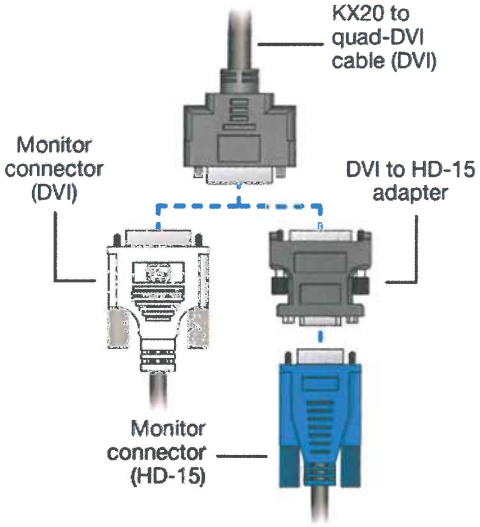
1. **GO D44 and GO D24:** Connect the KX20-to-quad DVI cable to connector **B** on the bracket of the card.

   GO D04: Connect the KX20-to-quad DVI cable to the connector on the bracket of the card.



2. If your display has a DVI connector, connect your display cable directly to your KX20-to-quad DVI cable.

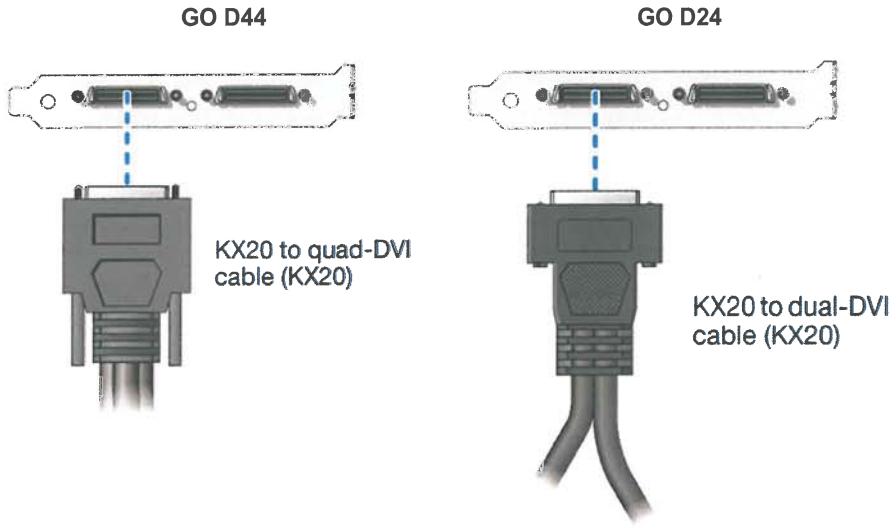
   If your monitor has an HD-15 connector, use a DVI-to-HD-15 adapter to connect your monitor cable to your KX20-to-quad DVI cable.



CONNECTING SOURCES

1. **GO D44:** Connect the KX20-to-quad DVI cable to connector **A** on the bracket of the card.

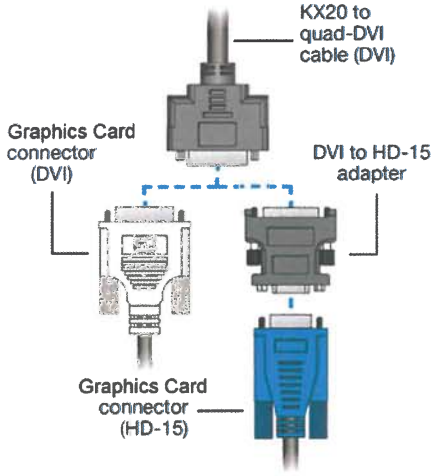
   GO D24: Connect the KX20-to-dual DVI cable to connector **A** on the bracket of the card.



2. If your source is a graphics card with a DVI connector, connect your graphics card cable directly to your KX20-to-quad DVI cable.

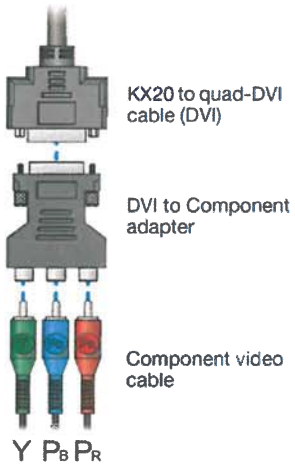
   If your source is a graphics card with an HD-15 connector, use a DVI-to-HD-15 adapter to connect your graphics card cable to your KX20-to-quad DVI cable.

   For video sources, refer to the following steps.



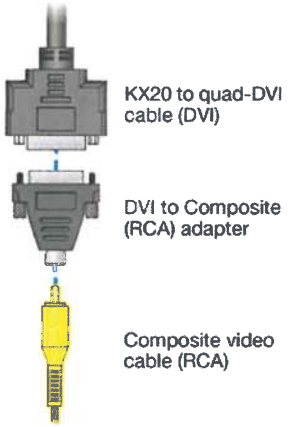
3. For connecting **component** video sources, you need a DVI-to-component video (RCA) adapter.

   Connect the adapter to a DVI connector on your KX20-to-quad DVI (or KX20-to-dual DVI) cable. Connect your source to the Y, Pb and Pr (RCA) connectors on the adapter.



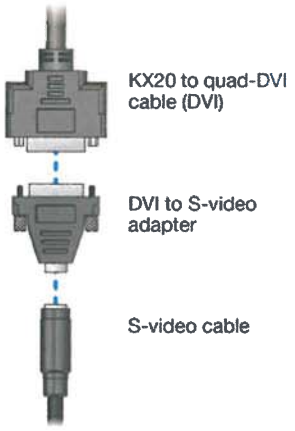
4. For connecting **composite** video sources, you need a DVI-to-composite video (RCA) adapter.

   Connect the adapter to a DVI connector on your KX20-to-quad DVI (or KX20-to-dual DVI) cable. Connect your source to the composite connector on the adapter.



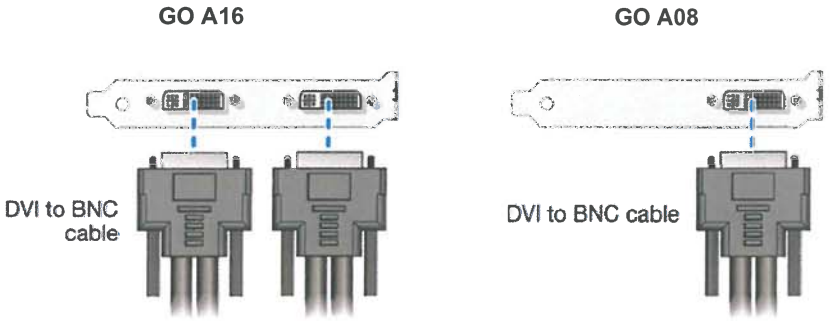
5. For connecting **S-video** sources, you need a DVI-to-S-video adapter.

   Connect the adapter to a DVI connector on your KX20-to-quad DVI (or KX20-to-dual DVI) cable. Connect your source to the S-Video connector on the adapter.



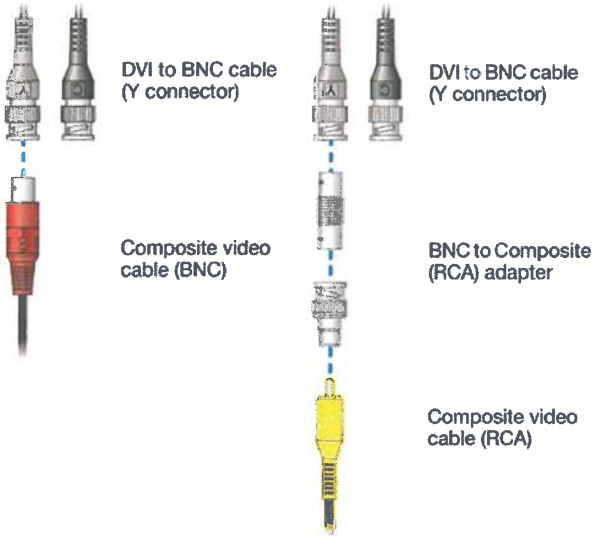
2.4.3 Connections to the GO A16 and GO A08 I/O Cards

1. Connect the DVI-to-BNC cable(s) to the connector(s) on the bracket of the card.

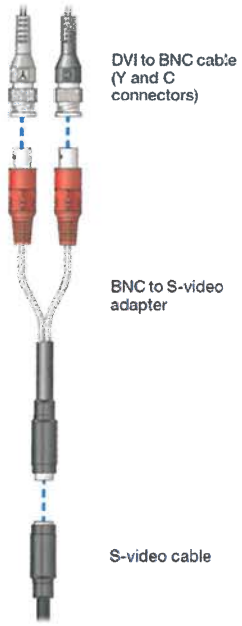


2. Connect a **composite** video source to a **Y** connector on the DVI-to-BNC cable.

   If the Composite video cable has RCA connectors, you need a BNC-to-composite video (RCA) adapter. Connect the adapter to a **Y** connector on the DVI-to-BNC cable. Connect your source to the RCA connector on the adapter.


DVI to BNC cable (Y connector)
Composite video cable (BNC)
DVI to BNC cable (Y connector)
BNC to Composite (RCA) adapter
Composite video cable (RCA)

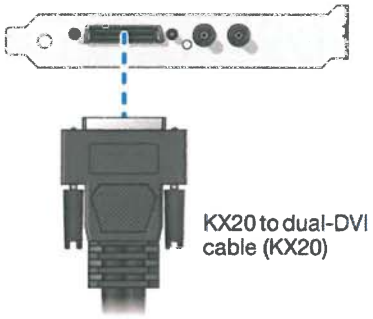
3. For an **S-video** source, connect a BNC-to-S-video adapter to a **Y/C** connector pair on the DVI-to-BNC cable. Connect your source to the S-video (mini-DIN) connector on the adapter.



2.4.4 Connections to the GO S22 I/O Card

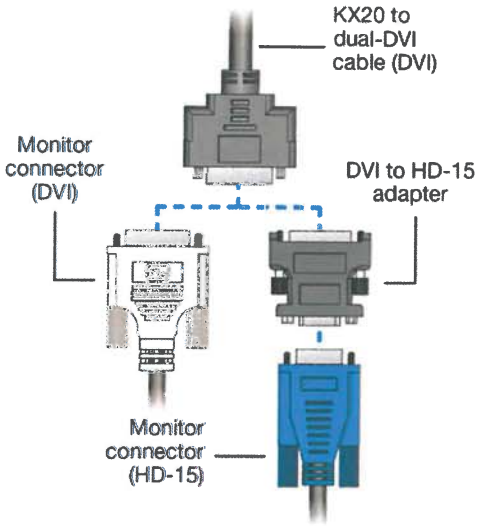
CONNECTING DISPLAYS

1. Connect the KX20-to-dual DVI cable to the connector on the bracket of the card.



2. If your display has a DVI connector, connect your display cable directly to your KX20-to-dual DVI cable.

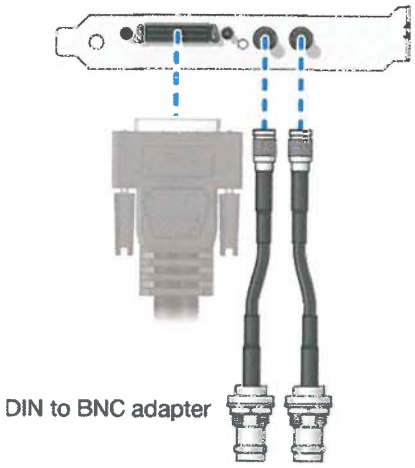
   If your monitor has an HD-15 connector, use a DVI-to-HD-15 adapter to connect your monitor cable to your KX20-to-dual DVI cable.



CONNECTING SOURCES

Connect DIN-to-BNC adapters to the DIN connectors on the bracket of the card.

Connect your SDI sources to the BNCs on the adapters.



Note

To disconnect an SDI source from the GO S22 I/O card, firmly hold the adapter, pull back the metal ring around the DIN connector on the cable, then carefully remove the adapter. This will prevent damage to the DIN connector on the DIN-to-BNC adapter or on the I/O card.

2.4.5 Connection to a Network

Use a standard, Cat 5 or Cat 6 network cable with an RJ-45 plug to connect a network hub, router or gateway to an Ethernet port on the SBC in the Display Processor; see **Figure 2-9**.

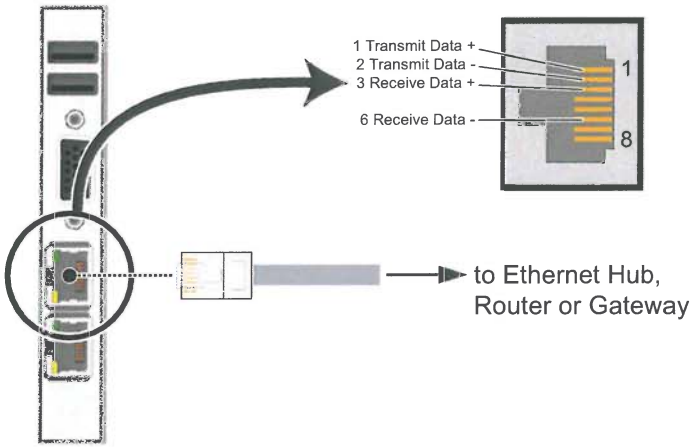


Figure 2-9 Connecting the Display Processor to a Network

2.5 Applying Power to the Galileo Display Processor

Important Whenever you turn on or reset the Display Processor, make sure your monitors are already turned on. Otherwise, the system may have difficulty detecting your monitors.

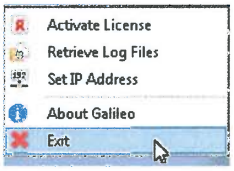
1. Turn on your displays.
2. Turn on your source components.
3. Plug the female end of one of the supplied power cords into an AC receptacle at the rear of the Display Processor (AC 100V ~ 240V). See **Figure 1-2**.
4. Connect the other end to an AC power source.
5. Repeat Steps 3 and 4 for the second power supply.
6. Press the power (black) switch on the front of the Display Processor (see **Figure 1-1**). The power indicator lights green.
7. After a brief period, the Display Processor should display the Windows log-on screen.
8. Log on to Windows as user `rgb`, with the password `spectrum`.

CHAPTER 3

CONFIGURING YOUR VIDEO WALL AND I/O CARDS

Because the configuration utility provided with Galileo requires exclusive access to the graphics cards, you must first end all other processes that access them. On the Display Processor, these processes are **GalileoServer.exe** and **WindowsManager.exe**.

On the right side of the Windows Taskbar, right-click the Galileo Server icon and select **Exit**. This will also end the **WindowsManager.exe** process.



3.1 Accessing PowerDesk

To launch PowerDesk, click **Start > All Programs** (or **Programs**) **> Matrox® Graphics > Matrox PowerDesk**. Or, right-click anywhere on the Windows desktop and select **Launch Matrox PowerDesk**.

Matrox PowerDesk
Home
Multi-Display Setup
Set up and configure your multiple displays.
Desktop Management
Control how and where program windows and dialog boxes appear on your Windows desktop.
Edge Overlap and Bezel Management
Adjust your monitor bezels to create an image that appears seamlessly across your monitors.
Keyboard Shortcuts
Define keyboard shortcuts for PowerDesk features and controls.
System Settings
Change settings for all users on this system.
Administrator Options
Create administrator defaults or overrides for certain PowerDesk features and controls.
Help and Troubleshooting
Get help and troubleshooting information for your graphics hardware and software.
About
Get information on your graphics hardware and software.

Figure 3-1 PowerDesk Home Screen

3.2 Setting Up Your Video Wall Layout

Setting up your video wall layout with PowerDesk involves entering the number of columns and rows for your layout and adjusting certain output settings, such as rotation, resolution, color palette, and refresh rate.

To set up your video wall layout:

1. From the home screen, select **Multi-Display Setup**.

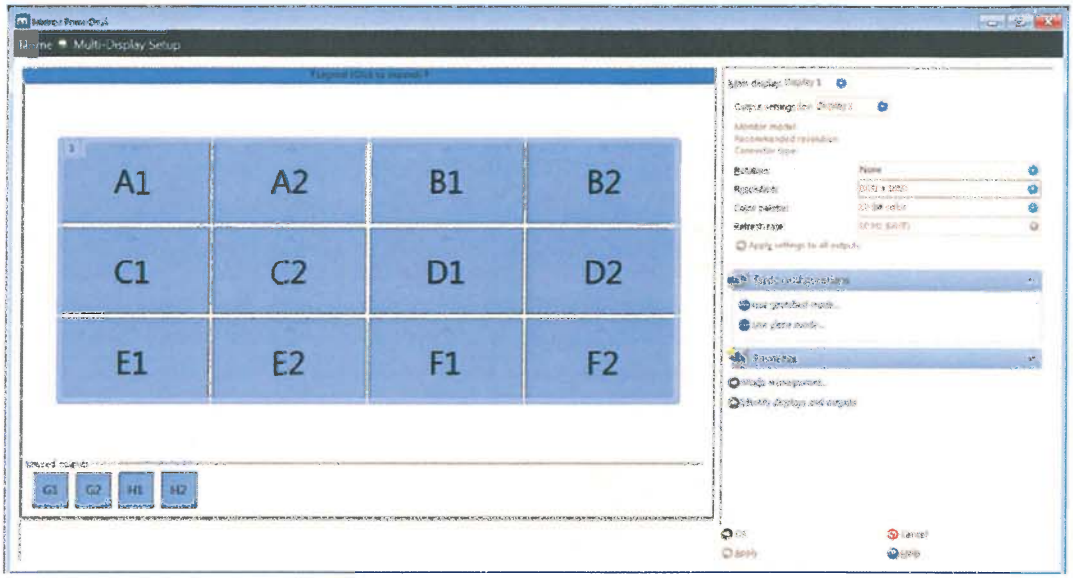


Figure 3-2 Multi-Display Setup

2. Under **Basic configurations**, select **Use stretched mode...**

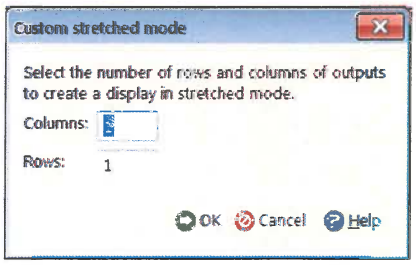


Figure 3-3 Stretched Mode Settings

3. Enter the number of **Columns** and **Rows** in your video wall, then click **OK**.
4. Preview your setup in the work area. If you're satisfied, click **OK** or **Apply** to apply your video wall layout. Otherwise, click **Cancel**.

You may need to manually rearrange the outputs of your multi-display layout in PowerDesk to match the physical layout of your video wall. Or, use the suggested PowerDesk layout to configure your wall.

Use the **Rotation**, **Resolution**, **Color palette**, and **Refresh rate** controls to change those output settings. In most cases, PowerDesk will automatically set these to the correct values.

3.3 Bezel Management and Edge Overlap

When using a multi-display stretched desktop, the image can sometimes appear misaligned and distorted due to the space between your monitors.

3.3.1 Bezel Management

With bezel management, you can adjust the image to compensate for the physical space created by the bezels of your monitors.

The result is an image that appears seamlessly across your monitors. This feature is available only while using stretched mode.

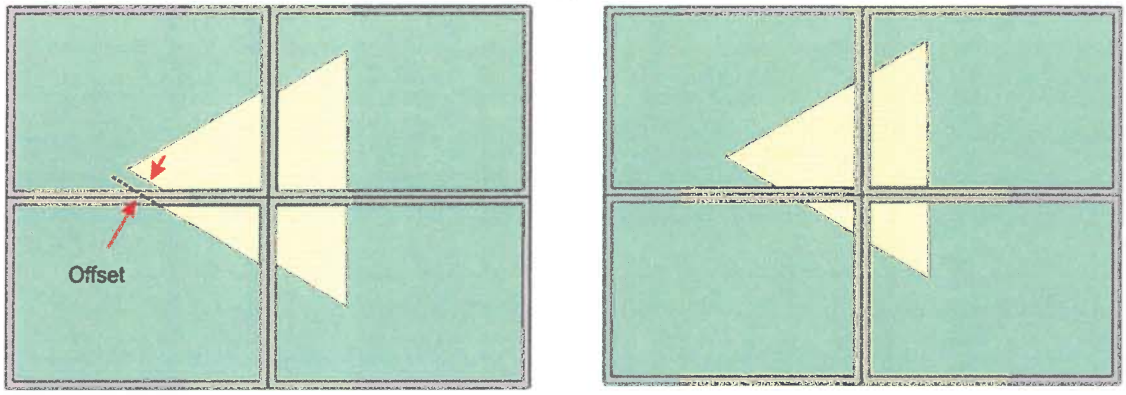


Figure 3-4 Bezel Management

3.3.2 Edge Overlap

Using Bezel Management, you can correct a distortion in the final image due to the offset caused by the bezel surrounding individual display devices. An opposite issue can occur when implementing walls using front or rear projection. This requires a feature known as Edge Overlap.

With Edge Overlap, you can adjust the number of overlapping pixels between displays to create a seamless transition between the images from adjacent projectors.

Figure 3-5 Edge Overlap

3.3.3 Bezel Management/Edge Overlap Settings

Tip	To show the display numbers on your wall, click **Identify displays** before creating an adjustment.

To apply bezel management or edge overlap to your video wall:

1. From the home screen, select **Edge Overlap and Bezel Management**.
2. Select the display to be adjusted, then click **Modify...**. A square appears in the selected display and all areas are highlighted in green.
3. Select **Bezel management** to adjust the number of hidden pixels or **Edge overlap** to create an overlap between displays.

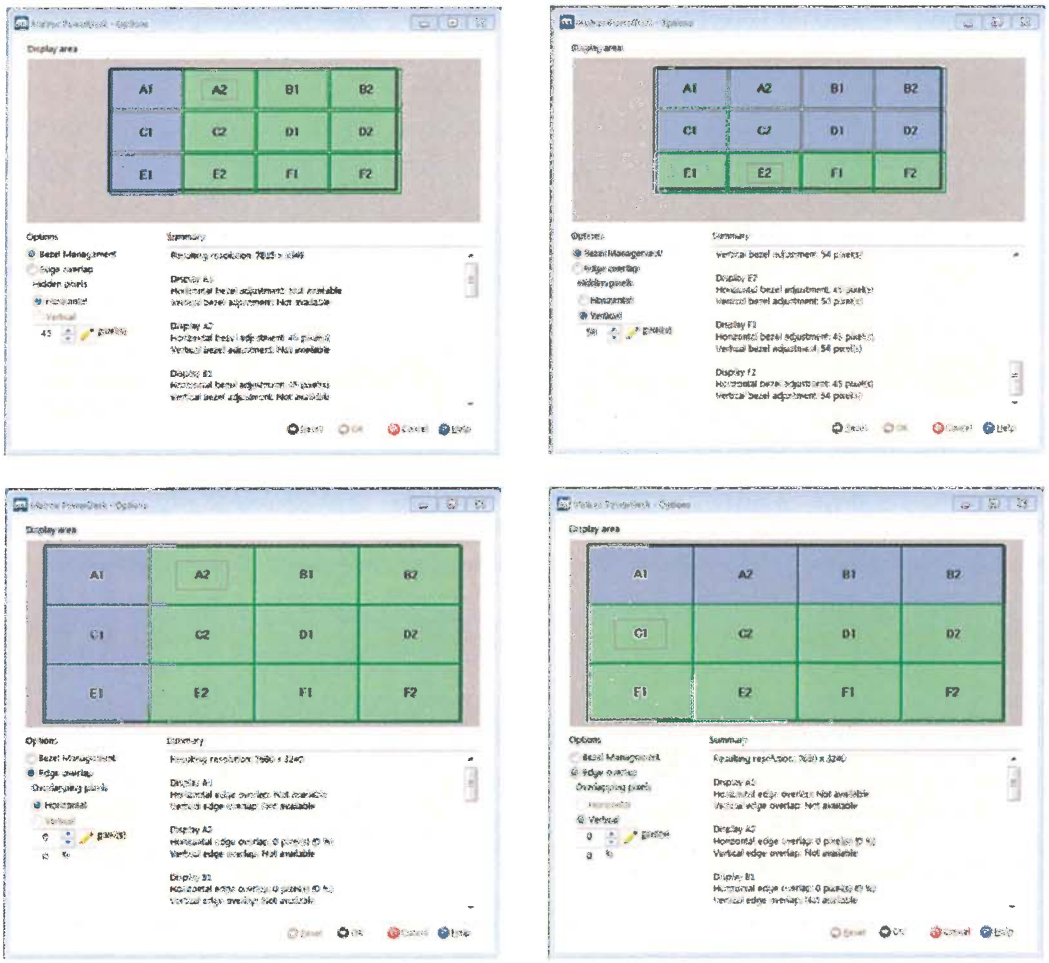
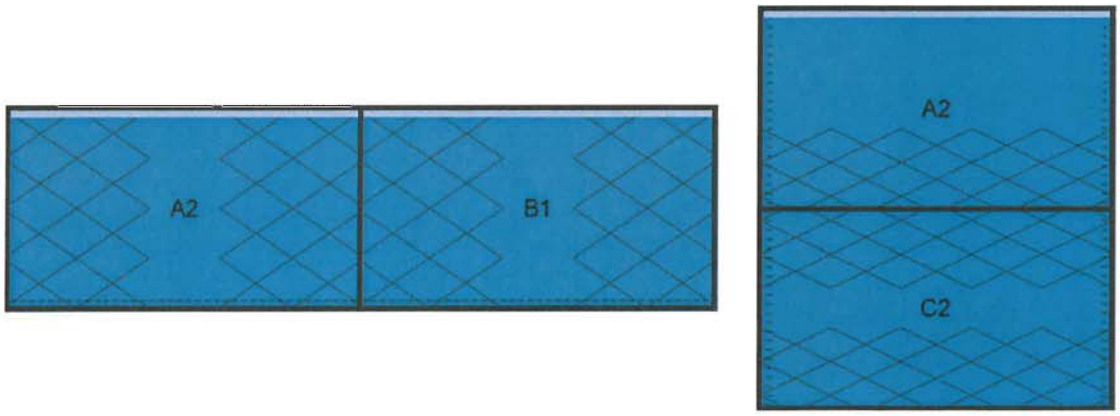


Figure 3-6 Bezel Management and Edge Overlap Controls

4. Use the adjustment options to increase the vertical and/or horizontal seams, or click (✎) to specify the number of pixels. As you do this, the lines move to form a perfectly aligned grid.

Note	For bezel management, the maximum adjustment is 25% of your display resolution. For example, on a 1920 × 1080 display, the maximum settings are 480 pixels (horizontal) and 270 pixels (vertical). For an overlap, you can adjust the position of your display up to 25% of your display resolution.



5. When you're done, click **OK**.

3.4 Restarting the Display Processor

After you have finished setting up PowerDesk, **restart Windows on the Display Processor** and Galileo Server will restart automatically.

Note	For more help using PowerDesk, please refer to the help file included with the software.

CHAPTER 4 WINDOWS FIREWALL SETTINGS

Depending on the restrictions enforced by your current Firewall configuration, you may need to perform the following steps to allow Galileo to communicate over the network. These instructions are intended for Windows 7.

4.1 Ports

Galileo uses the TCP port numbers listed in **Table 4-1** for communication between the client and the server, and with the Network API.

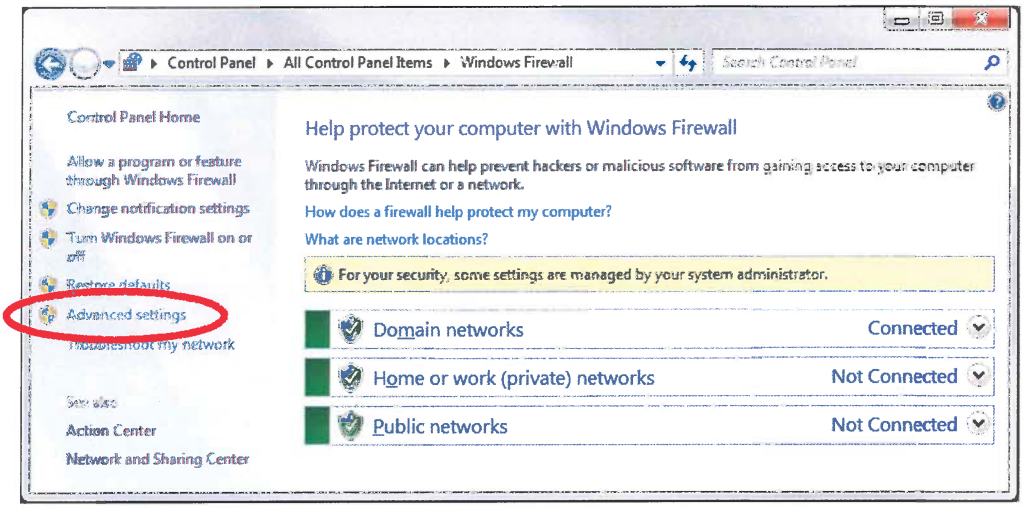
Table 4-1 TCP Ports Used by Galileo

TCP Port	Description
Galileo Server	
50000	Galileo Services
50001	Network Command Interface (TCP/IP Command)
50002	Virtual MousePad Image Receiver (Clients being displayed on the video wall)
50004	Virtual MousePad Keyboard / Mouse Control and Remote View
23	Network API
Galileo Client	
50005	Virtual MousePad Image Receiver (Clients being displayed locally)
50006 and Above	Concurrent Video Wall Connections. This is for connecting to multiple video walls from the same Client PC. Each new Video Wall (opened in tabs) requires its own TCP port in order to connect.
Galileo Lightweight Client	
50004	Virtual MousePad Keyboard / Mouse Control and Remote View

4.2 Galileo Server

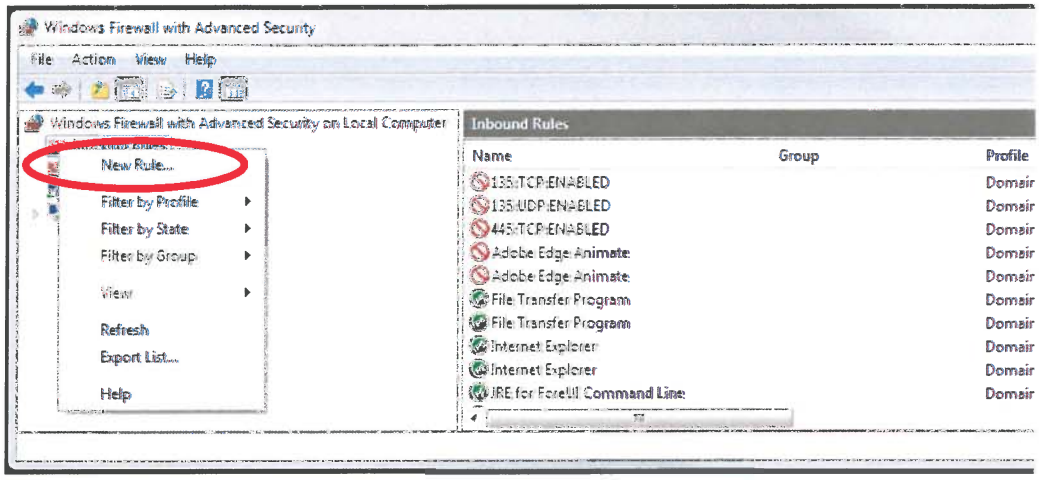
To modify your Windows Firewall settings on the Display Processor for Galileo Server:

1. From the Windows Start Menu, choose **Control Panel**.
2. If your Control Panel is in "Category" view, select the **System and Security** category.
3. Select **Windows Firewall**.
4. On the left-hand side menu, select **Advanced Settings**.

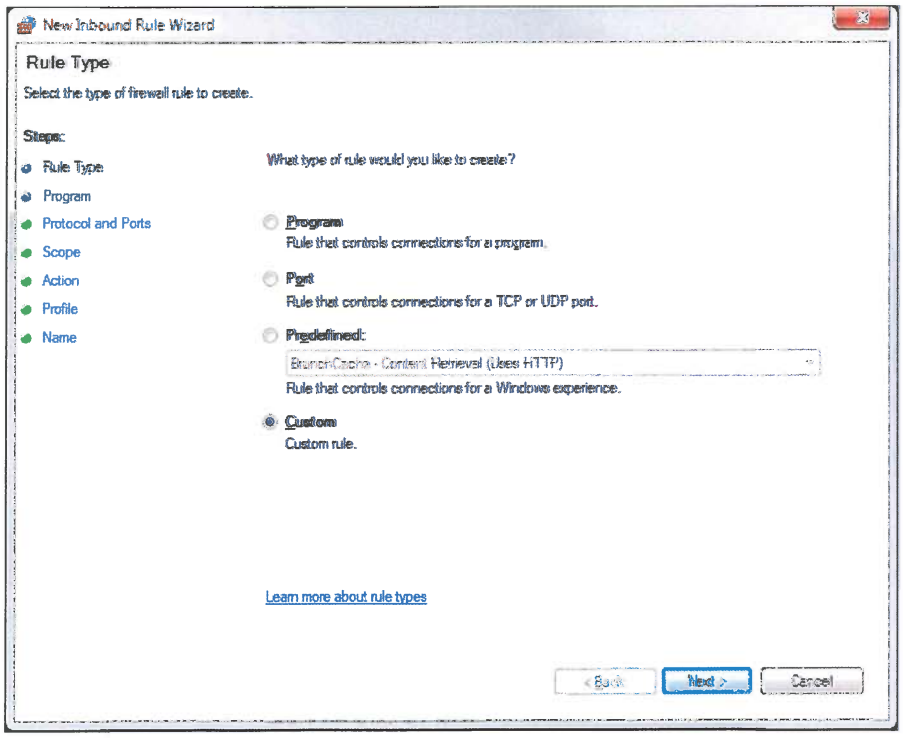

Control Panel ▸ All Control Panel Items ▸ Windows Firewall
Control Panel Home
Allow a program or feature through Windows Firewall
Change notification settings
Turn Windows Firewall on or off
Restore defaults
Advanced settings
Troubleshoot my network
See also
Action Center
Network and Sharing Center
Help protect your computer with Windows Firewall
Windows Firewall can help prevent hackers or malicious software from gaining access to your computer through the Internet or a network.
How does a firewall help protect my computer?
What are network locations?
For your security, some settings are managed by your system administrator.
Domain networks
Connected
Home or work (private) networks
Not Connected
Public networks
Not Connected

5. Another window opens, titled **Windows Firewall with Advanced Security**.
6. On the left-hand side, under the heading **Windows Firewall with Advanced Security on Local Computer**, click **Inbound Rules**.

7. Right-click **Inbound Rules** and select **New Rule...**



8. On the first screen of the **New Inbound Rule Wizard**, select **Custom** as the type of rule to create.



9. Click **Next**.

10. Select **This Program Path** and browse to, or type, the installation directory of Galileo Server:
    C:\Program Files (x86)\RGB Spectrum\Galileo Server\GalileoServer.exe.
11. Click **Next**.
12. Set the **Protocol type to TCP**.
13. For **Local port,** select **Specific Ports**.
14. In the text field just below, type all the ports required by Galileo Server:
    - Port **50000** is required by all features.
    - Port **50001** is required by the Network Command Interface feature, to control Galileo from third party applications.
    - Port **50002** is required by the Remote Clients feature, to display remote captures of network computers on the video wall.
    - Port **50004** is required by the Virtual Mouse Pad feature, to view the video wall's desktop remotely and to control it with remote mouse and keyboard.

    For example, for every feature the text field should contain: **50000,50001,50002,50004**.
15. For **Remote port**, select **All ports**.
16. Click **Next**.
17. Select **Any IP address** for both the **local IP addresses** and the **remote IP addresses**.
18. Click **Next**.
19. Select **Allow the connection**.
20. Click **Next**.
21. Check the **Domain** and **Private** boxes. Un-check the **Public** box.
22. Click **Next**.
23. Give a name for this Firewall rule. We suggest **Galileo Server**.
24. Click **Finish**.

This will allow every computer on the local network or domain to connect to Galileo Server on the Video Wall controller.

4.3 Galileo Client

To modify your Windows Firewall settings on Galileo Client PCs:

1. Follow Steps 1 through 9 above for creating a new, custom firewall rule.
2. Select **This Program Path** and browse to, or type, the installation directory of Galileo Client:
   C:\Program Files (x86)\RGB Spectrum\Galileo Client\GalileoClient.exe.
3. Click **Next**.
4. Set the **Protocol type to TCP**.
5. For **Local port,** select **Specific Ports**.
6. In the text field just below, type all the ports required by Galileo Server:
   - Port **50005** is required by the Virtual MousePad Image Receiver.
   - Ports **50006** and above are required for concurrent Video Wall connections. This is for connecting to multiple video walls from the same Client PC. Each new Video Wall (opened in tabs) requires its own TCP port in order to connect.

   For example, for every feature the text field should contain: **50005,50006**.
7. For **Remote port**, select **All ports**.
8. Click **Next**.
9. Follow Steps 17 through 24 above for creating a new, custom firewall rule.

CHAPTER 5

INSTALLING GALILEO CLIENT AND GALILEO REMOTE HOST

This chapter describes the installation procedures for Galileo Client and Galileo Remote Host.

5.1 System Requirements

Galileo Client and Galileo Remote Host require the following software and hardware to operate correctly:

- Windows XP SP3, Windows 7 or Windows 8
- .NET 4 Runtime Extended
- Recommended CPU: Intel Core i5 or above
- Recommended RAM: 4 GB or more

Note Windows XP 64-bit requires the "Windows Imaging Component" for the .NET 4 Runtime to install.

5.2 Client Installation

To install the Galileo Client on the computer(s) from which you want to control the video wall:

1. Locate the Galileo Client Setup program, **Galileo Client Installer - x.x.x.x.exe** (where **x.x.x.x** is the version number) on the *Galileo Display Processor Technical Resources* CD. (Optionally, copy the Setup program to your desktop or other convenient location.)
2. Double-click on the Setup program file.

Setup - Galileo Client
Welcome to the Galileo Client Setup Wizard
This will install Galileo Client 2.4.5.2 on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel

Figure 5-1 Galileo Client Setup – Welcome

3. Click **Next**.

Setup - Galileo Client
License Agreement
Please read the following important information before continuing.
Please read the following License Agreement. You must accept the terms of this agreement before continuing with the installation.
GALILEO SOFTWARE LICENSE AGREEMENT
This Agreement is entered into as of the date of the electronic acceptance of this agreement between RGB Spectrum ("RGB") and the company executing the acceptance as licensee ("Licensee"). The Software (as defined below) that is licensed under this Agreement is installed on computers supplied by
I accept the agreement
I do not accept the agreement
< Back
Next >
Cancel

Figure 5-2 Galileo Client Setup – License Agreement

4. Click **I accept the agreement**, then click **Next**.

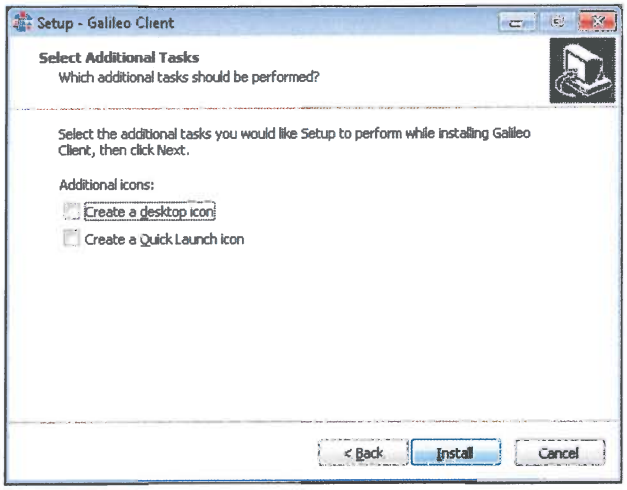

Setup - Galileo Client
Select Additional Tasks
Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing Galileo Client, then click Next.
Additional icons:
Create a desktop icon
Create a Quick Launch icon
< Back
Install
Cancel

Figure 5-3 Galileo Client Setup – Create Icons

5. If you would like Setup to create desktop and/or Quick Launch icons, check the boxes so labeled. Then, click **Install**.

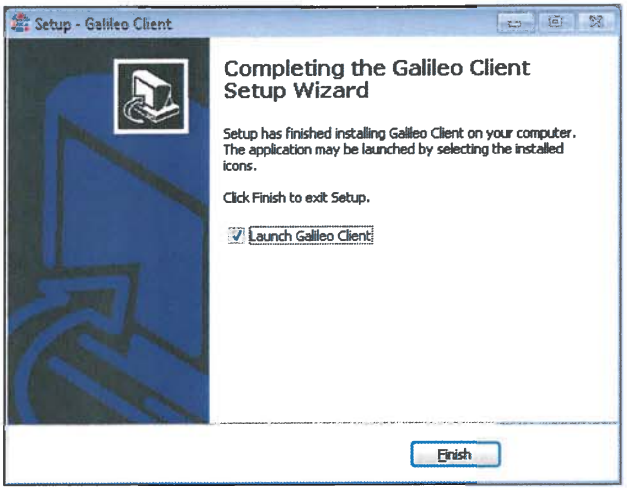

Setup - Galileo Client
Completing the Galileo Client Setup Wizard
Setup has finished installing Galileo Client on your computer. The application may be launched by selecting the installed icons.
Click Finish to exit Setup.
Launch Galileo Client
Finish

Figure 5-4 Galileo Client Setup – Installation Successful

6. Click **Finish** to exit the Setup program.
7. Repeat Steps 2 through 6 as needed, on other Client PCs.

5.3 Remote Host Installation

The Galileo Remote Host enables control of a computer by other Galileo Clients on the network, and display of its output on the Video Wall.

To install the Galileo Remote Host on a computers you want to be "seen" on the network by the server:

1. Locate the Galileo Remote Host Setup program, **Galileo Remote Host Installer - x.x.x.x.exe** (where **x.x.x.x** is the version number) on the *Galileo Display Processor Technical Resources* CD. (Optionally, copy the Setup program to your desktop or other convenient location.)
2. Double-click on the Setup program file.

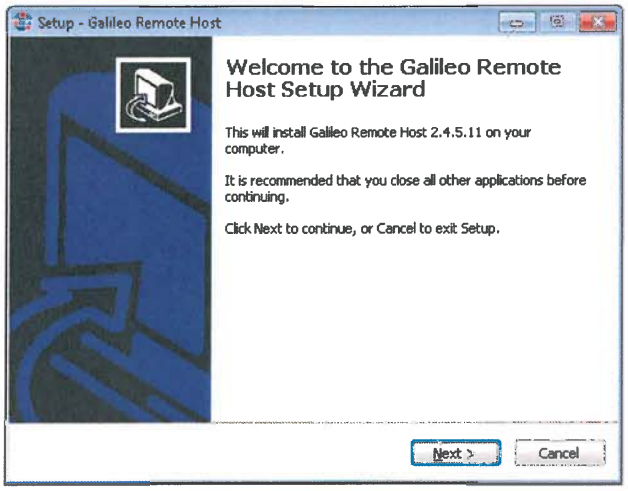

Setup - Galileo Remote Host
Welcome to the Galileo Remote Host Setup Wizard
This will install Galileo Remote Host 2.4.5.11 on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel

Figure 5-5 Galileo Remote Host Setup – Welcome

3. Click **Next**.

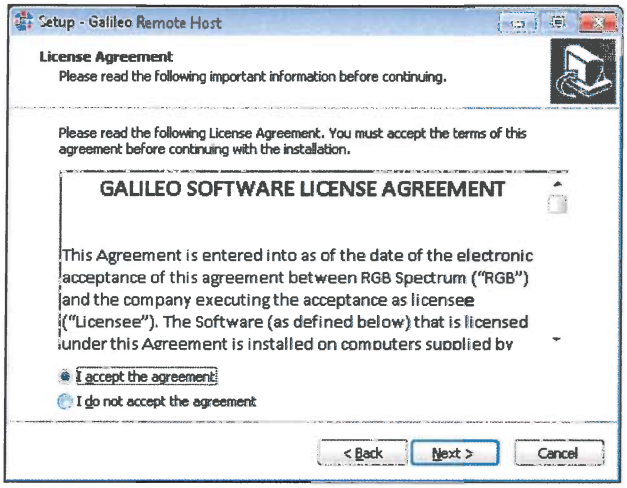

Setup - Galileo Remote Host
License Agreement
Please read the following important information before continuing.
Please read the following License Agreement. You must accept the terms of this agreement before continuing with the installation.
GALILEO SOFTWARE LICENSE AGREEMENT
This Agreement is entered into as of the date of the electronic acceptance of this agreement between RGB Spectrum ("RGB") and the company executing the acceptance as licensee ("Licensee"). The Software (as defined below) that is licensed under this Agreement is installed on computers supplied by
I accept the agreement
I do not accept the agreement
< Back
Next >
Cancel

Figure 5-6 Galileo Remote Host Setup – License Agreement

4. Click **I accept the agreement**, then click **Next**.

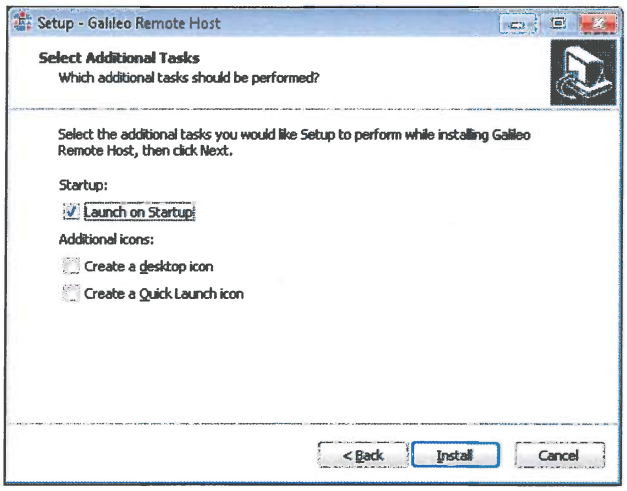

Setup - Galileo Remote Host
Select Additional Tasks
Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing Galileo Remote Host, then click Next.
Startup:
Launch on Startup
Additional icons:
Create a desktop icon
Create a Quick Launch icon
< Back
Install
Cancel

Figure 5-7 Galileo Remote Host Setup – Additional Tasks

5. If you would like Galileo Remote Host to launch when Windows starts (recommended), check the **Launch on Startup** box.

   If you would like Setup to create desktop and/or Quick Launch icons, check the boxes so labeled.

   Then, click **Install**.

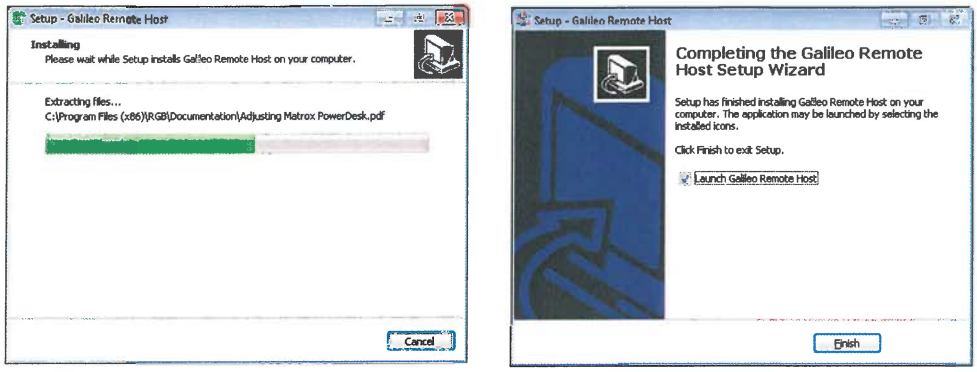
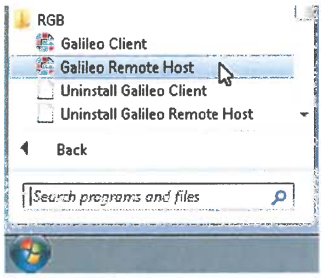

Setup - Galileo Remote Host
Installing
Please wait while Setup installs Galileo Remote Host on your computer.
Extracting files...
C:\Program Files (x86)\RGB\Documentation\Adjusting Matrox PowerDesk.pdf
Cancel
Setup - Galileo Remote Host
Completing the Galileo Remote Host Setup Wizard
Setup has finished installing Galileo Remote Host on your computer. The application may be launched by selecting the installed icons.
Click Finish to exit Setup.
Launch Galileo Remote Host
Finish

Figure 5-8 Galileo Remote Host Setup – Installation Successful

6. Click **Finish** to exit the Setup program.
7. Repeat Steps 2 through 6 as needed, on other Remote Host PCs.

To launch Galileo Remote Host (if it does not do so automatically), choose **Start > All Programs > RGB >** Galileo Remote Host.



To configure Galileo Remote Host, right-click on its taskbar icon ( ). For instructions on how to connect and configure a Remote Host, refer to the chapter entitled “Managing Remote Clients” in the *Galileo Video Wall Control Software User’s Guide*.

CHAPTER 6 SCRIPTING COMMANDS

Galileo Client allows operators to manipulate the Video Wall or an external device programmatically, to simplify common tasks. This section provides a complete list of scripting commands and their usage. For instructions on how to organize, use, and create scripts using Galileo Client, refer to the *Galileo Video Wall Control Software User's Guide*.

6.1 Layout Commands

6.1.1 GetLayoutNames

Use the GetLayoutNames command to read the names of the layouts that are currently saved on the video wall controller.

```
Result : { Text }
```

A sequence containing all layout names.

Examples

```
Names = GetLayoutNames;
# Names = { "Layout 1", "Layout 2" }
```

6.1.2 Open Layout:

Note Opening a layout on the video wall will automatically close all the windows on the video wall.

Use the Open Layout command to open a layout across the whole video wall.

```
Layout : Text
```

The layout is identified by its name, as it appears in the Layouts list in the Galileo Client.

```
Result : ()
```

The command is only used for its effect on the video wall.

Example

```
Open Layout: "Scenario 1"
```

6.2 Window Commands

6.2.1 Open Window: Source:

Use the Open Window Source command to put a source in a specific window.

```
Window : Number
```

The window is identified by its number, as seen on the Galileo interface.

```
Source : < input : Text, client : Text, application : Text >
```

The source opened in the window can be any of the sources types supported by Galileo, that is hardware inputs, remote clients connected to the video wall, and local applications on the video wall controller.

The text used to identify an input is its name, as it appears in the Inputs list of Galileo.

The text used to identify a remote client is its name, as it appears in the Clients list of Galileo. That is, its given name or its IP address.

The text used to identify an application is the path of the executable on the video wall controller.

```
Result : ()
```

The command is only used for its effect on the video wall.

Examples

```
Open Window: 1 Source: input("Camera 1");
Open Window: 2 Source: client("192.168.1.27");
Open Window: 3 Source: application("C:/Program Files/Acme/
Tool.exe");
```

6.2.2 Open Window: Layout:

Use the Open Window Layout command to put a layout in a specific window.

```
Window : Number
```

The window is identified by its number, as seen on the Galileo interface.

```
Layout : Text
```

The layout opened in the window is identified by its name, as it appears in the Layouts list of Galileo.

```
Result : ()
```

The command is only used for its effect on the video wall.

Examples

```
Open Window: 1 Layout: "Layout 2";
Open Window: 2 Layout: "Layout 1";
```

6.2.3 CreateWindow Monitor:

Use the CreateWindow command to create a new empty window on the layout visible to Galileo clients. This window can later be filled with any source available to the operators.

```
Monitor : { Number }
```

Two numbers which represent the position of the monitor to cover with the new window. The first is the horizontal position and the second is the vertical position.

```
Result : Number
```

The number assigned to the newly created window. It can be used in subsequent commands to modify the content of the window.

Examples

```
Number = CreateWindow Monitor: { 3, 2 };
Open Window: Number Source: layout("Morning Scenario");
```

6.2.4 CreateWindow Horizontal: Vertical:

Use the CreateWindow command to create a new empty window on the layout visible to Galileo clients. This window can later be filled with any source available to the operators.

```
Horizontal : { Number }
```

Two numbers which represent the horizontal extent covered by the new window. The first is leftmost position (included) and the second is the rightmost position (excluded).

```
Vertical : { Number }
```

Two numbers which represent the vertical extent covered by the new window. The first is topmost position (included) and the second is the bottommost position (excluded).

```
Result : Number
```

The number assigned to the newly created window. It can be used in subsequent commands to modify the content of the window.

Examples

```
Number = CreateWindow Horizontal: { 0, 1920 } Vertical: {
0, 1280 };
Open Window: Number Source: layout("Morning Scenario");
```

6.2.5 CloseWindows SourceType:

Use the CloseWindows command to close all the windows on the video wall. You can optionally give the type of sources to close. By default, the command will close all windows.

```
SourceType : all | inputs | applications | clients
```

The type of sources to remove from the video wall. If the SourceType is not given, it is equivalent to all.

```
Result : ()
```

The command is only used for its effect on the video wall.

Examples

```
CloseWindows SourceType: all;
CloseWindows SourceType: inputs;
CloseWindows SourceType: applications;
CloseWindows SourceType: clients;
CloseWindows;  # Same as CloseWindows SourceType: all;
```

6.2.6 Clear Window:

Use the Clear command to close a single window on the video wall. The window will become empty on the Galileo interface and can be manipulated again.

```
Window : Number
```

The window is identified by its number, as seen in the Galileo Client.

```
Result : ()
```

The command is only used for its effect on the video wall.

Example

```
Clear Window: 3;
```

6.3 Other Commands

6.3.1 Execute Script:

Use the Execute command to run a script that has been saved on the video wall controller.

```
Script : Text
```

The script is identified by its name, as it appears in the Scripts list in Galileo Client.

```
Result : ()
```

The command is only used for its effect on the video wall.

Example

```
Execute Script: "Script 1";
```

6.3.2 ExecuteProgram Path: Arguments:

Use the ExecuteProgram command to launch an application installed on the Galileo Display Processor.

```
Path : Text
```

The path of the executable to launch on the video wall controller.

```
Arguments : Text
```

The arguments for the program to execute.

```
Result : ()
```

The command is only used for its effect on the video wall.

Examples

```
ExecuteProgram Path: "C:/Program Files (x86)/Mozilla
Firefox/firefox.exe";
ExecuteProgram Path: "C:/Program Files (x86)/Mozilla
Firefox/firefox.exe" Arguments: "www.rgb.com";
```

6.3.3 Connect IP: Port:

Use the Connect command to communicate with an external service over a TCP/IP connection.

```
IP : Text
```

The IP address of the external service, in dotted quad notation.

```
Port : Number
```

The port of the external service.

```
Result : [ Send : Text ] -> ()
```

A function that can be used to send text messages to the external service.

Examples

```
GalileoNCI = Connect IP: "127.0.0.1" Port: 50001;
GalileoNCI Send: "Clear Window: 2\n";
```

6.3.4 ConnectTelnet IP: Port:

Use the ConnectTelnet command to communicate with an external service over a Telnet connection.

```
IP : Text
```

The IP address of the external service, in dotted quad notation.

```
Port : Number
```

The port of the external service.

```
Result : [ Send : Text ] -> ()
```

A function that can be used to send text messages to the external service.

Examples

```
GraphicsCardAPI = ConnectTelnet IP: "127.0.0.1" Port: 23;
GraphicsCardAPI Send: "AddWindow \"Galileo\"
100,100,2000,2000";
```

(Note that the inner set of quotation marks is escaped with the backslash character.)

6.3.5 StartTransition Name: Windows: Repeat:

Use the StartTransition command to run a transition with a given set of windows.

```
Name : Text
```

The name of the transition to start.

```
Windows : { Number }
```

A comma-delimited list of numbers corresponding to windows open on the video wall.

```
Repeat (optional) : true | false
```

Specifies if the transition will only execute once, or if it will repeat itself after its assigned duration.

Examples

```
StartTransition Name: "Transition 1" Windows: {1, 3, 5};
StartTransition Name: "Transition 2" Windows: {2, 4}
Repeat: true;
```

CHAPTER 7 GALILEO JAVASCRIPT API

This chapter describes how to use the Galileo JavaScript API. This API allows you to modify the Video Wall by starting scripts, saving the current state of the desktop as a layout, moving windows on the video wall, and more.

Please contact us at tech@rgb.com with the subject line "JavaScript API" with any questions, comments, or suggestions relating to the API or this document.

7.1 Before You Start

1. Ensure that the Galileo Server is running with the Web Server installed.
2. Make sure you can access the website from another computer. The Galileo Display Processor web site address is `http://[display_processor_IP_address]:81/galileo`; for example, `http://192.168.3.16:81/galileo`.

Figure 7-1 shows the Galileo Web Client control interface.

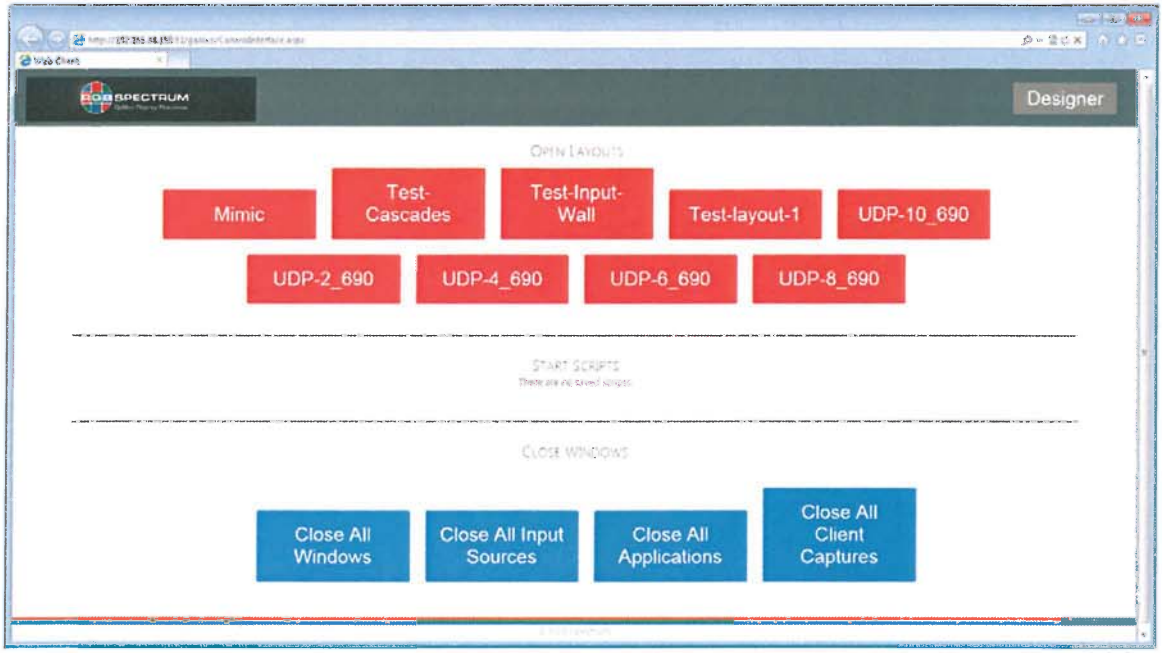


Figure 7-1 Galileo Web Client

7.2 Limitations and General Behavior

The Galileo JavaScript API works asynchronously with the Video Wall. Depending on the speed of your network, the speed of your Web Server, and other factors, commands you send to the Video Wall can take a couple of seconds to be executed. For this reason, you must always send to the API a function that executes when the command you sent is successful, and another function that executes if the command fails. They are called *functionOnSuccess* and *functionOnFail* throughout this document and in the JavaScript API. These two functions must always receive a single variable, which will be returned by the API. The content of these variables is described throughout this document.

This document makes references to both IDs and GUIDs. IDs are used to identify inputs that can be displayed on the video wall. IDs are used by the **GetInputs**, **OpenInput**, **CropInput**, and **GetCroppingArea** methods.

GUIDs are used when an input is opened and displayed on the Video Wall. GUIDs are used by the **ModifyWindow**, **GetSingleWindowState**, and **CloseWindow** methods.

All dimensions in the JavaScript API are values between 0 and 1 inclusive, and start from the top-left corner of the video wall desktop. For example, a point located in the center of the bottom-right part of the desktop would be represented as *X=0.75, Y=0.75*.

The Galileo JavaScript API includes various levels of security. Depending on the settings selected in the **Manage Browser Control** (refer to the *Galileo Video Wall Control Software User's Guide* for more information about the Browser Control), you will be asked to provide to the JavaScript API either the password you set in the Browser Control, a valid Galileo Username and Password or no password. Also, for security reasons, you need to call the *Authenticate* method of the API at least once every 24 hours, or every command you send will return an error.

If your Galileo Users have limited working areas, the API will only allow you to manipulate windows within the user's working area.

In this document:

- The ↳ symbol means there is another variable encapsulated in the parent variable. For example, the Error Code variable in the following code can be accessed using `variable_name.Code`.

  ↳ **Response**

  ↳ **Message** – Description of Message

  ↳ **Type** – Description of Type

  ↳ **Code** – Description of Code

- The ➢ symbol means a variable can have any value mentioned in the list.
- **0, 1, 2, 3 … n** means the current variable is an array that contains a variable number of entries. They can be counted using `Object.keys(variable_name.Data).length`.

7.3 Constructors

7.3.1 VideoWallConnection

The `VideoWallConnection` constructor is used in two contexts: when attempting to connect to the video wall for the first time and after a connection has been established.

Signature

```
VideoWallConnection(videoWallIP, functionOnSuccess, functionOnFail)
```

Description

Constructor used when attempting to connect for the first time to the video wall. This constructor validates the connectivity.

Inputs

`videoWallIP`	The IP address of the Galileo Display Processor.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

Signature

```
VideoWallConnection(userKey, videoWallIP)
```

Description

Constructor used when you already connected and have the User Key fetched from the `getUserKey` function. This constructor does not validate connectivity and is useful when accessing the Galileo JavaScript API from a page other than the login page.

Inputs

`userKey`	The User Key returned by the `getUserKey()` function
`videoWallIP`	The IP address of the Galileo Display Processor.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.4 Authentication Methods

7.4.1 GetAuthentiecationMethod

Signature

```
GetAuthenticationMethod (functionOnSuccess, functionOnFail)
```

Description

Gets the authentication method you selected in the **Manage Browser Control** option of the Galileo Server. Various authentication methods require different information.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

↳ **Data**

↳ **AuthenticationMethod –** The authentication type set under **Manage Browser Control** option of the server; one of the following:

➢ **UsernamePasswordAuthentication –** Requires a valid username/ password combination registered in the Galileo User Management Database. Can be compared using *VideoWallConnection.UsernamePasswordAuthentication.*

➢ **SinglePasswordAuthentication –** Requires a single password for logging. Can be compared using *VideoWallConnection.SinglePasswordAuthentication.*

➢ **NoAuthentication –** Requires no type of authentication. You can skip the *Authenticate* method and call manipulation functions directly. Can be compared with *VideoWallConnection.NoAuthentication.*

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.4.2 Authenticate

Signature

```
Authenticate (username, password, functionOnSuccess, functionOnFail)
```

Description

Authenticates the user to the Galileo Server. It inserts the User Key inside the Galileo JavaScript API, which allows you to run every other command below. You can skip authenticating if the authentication method is *VideoWallConnection.NoAuthentication.*

Inputs

`username`	➢ The username of a user in the Galileo Users Database if the authentication method is equal to *VideoWallConnection.UsernamePasswordAuthentication.* ➢ Otherwise, it can be an empty string ("").
`password`	➢ The password of the user mentioned if the authentication method is equal to *VideoWallConnection.UsernamePasswordAuthentication.* ➢ The password entered in the *"Manage Browser Control"* option on the server if the authentication method is equal to *VideoWallConnection.SinglePasswordAuthentication.* ➢ An empty string ("") if the authentication method is equal to *VideoWallConnection.NoAuthentication.*

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison. Error code 101 is returned in case of a wrong password if the authentication method is *VideoWallConnection.SinglePasswordAuthentication*. Error code 102 is returned in case of a wrong username/password combination if the authentication method is *VideoWallConnection.UsernamePasswordAuthentication*.

7.4.3 getUserkey

Signature

```
getUserKey()
```

Description

Gets the User Key. This User Key is a series of encrypted characters only useful to identify the user on the server side. It is automatically sent to Galileo with every request, and its value changes every day. For security reasons, you must not re-use this key for more than two days.

This method is local to the Galileo JavaScript API and does not have the same structure than the other methods. It simply returns the User Key.

Inputs

– None –

Return Value

The User Key.

7.5 Utility Methods

7.5.1 ExecuteScript

Signature

```
ExecuteScript (script, functionOnSuccess, functionOnFail)
```

Description

Executes a series of script commands.

Note	This method does not take the name of a script, but the script itself. To specify the name of a script to run, use **StartScript**.

Refer to the *Galileo Scripting Commands Reference* and *Galileo Scripting Language Specification* documents to learn how to write Galileo scripts.

`script`	The script you want to execute as plain text. Note that you must escape any backslashes used in the commands you would normally execute in the Script Editor.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.2 GetScreenResolution

Signature

```
GetScreenResolution (functionOnSuccess, functionOnFail)
```

Description

Gets the resolution of the video wall's desktop in pixels.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **Resolution**
    - **Horizontal** – The horizontal resolution in pixels.
    - **Vertical** – The vertical resolution in pixels.

Outputs of Function functionOnFail

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.
  - **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.
  - **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.3 GetScripts

Signature

```
GetScripts (functionOnSuccess, functionOnFail)
```

Description

Gets the saved scripts on the server.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **0, 1, 2, 3 … n** (where n = Number of inputs available).
    - **Name** – The name of the script.

Outputs of Function functionOnFail

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.
  - **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.
  - **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.4 StartScript

Signature

```
StartScript (scriptName, functionOnSuccess, functionOnFail)
```

Description

Starts the specified script on the server.

Inputs

`scriptName`	The name of a script saved on the server.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.5 GetNumberOfMonitors

Signature

```
GetNumberOfMonitors (functionOnSuccess, functionOnFail)
```

Description

Gets the number of screens of the video wall in terms of horizontal and vertical monitors.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **HorizontalMonitors** – The numbers of monitors horizontally.
  - **VerticalMonitors** – The numbers of monitors vertically.

Outputs of Function functionOnFail

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.
  - **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.
  - **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.6 SaveLayout

Signature

```
SaveLayout (layoutName, functionOnSuccess, functionOnFail)
```

Description

Saves all the sources being displayed on the desktop (Inputs, Applications, Client Capture and other layouts) into a layout.

Inputs

`layoutName`	The name of the layout.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.7 DeleteLayout

Signature

```
DeleteLayout (layoutName, functionOnSuccess, functionOnFail)
```

Description

Delete a layout.

Inputs

`layoutName`	The name of the layout.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.8 GetWorkingArea

Signature

```
GetWorkingArea (functionOnSuccess, functionOnFail)
```

Description

Gets the area of the video wall the currently logged in user is allowed to manipulate.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **Position**
    - **Top** – The Y coordinate of the top border of the user's working area on a [0, 1] scale.
    - **Left** – The X coordinate of the left border of the user's working area on a [0, 1] scale.
    - **Bottom** – The Y coordinate of the bottom border of the user's working area on a [0, 1] scale.
    - **Right** – The X coordinate of the right border of the user's working area on a [0, 1] scale.

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.9 GetLicenseInformation

Signature

```
GetLicenseInformation (functionOnSuccess, functionOnFail)
```

Description

Returns information regarding the license: available features, whether or not you're authorized to use the JavaScript API et cetera.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **JavascriptAPIVersionNumber** – The version of the JavaScript API on the server-side.
  - **AllowedToHaveClientCapture** – "True" if your license allows you to use and manipulate Client Capture windows, "False" otherwise.
  - **AllowedToHaveInputs**– "True" if your license allows you to use and manipulate Input windows, "False" otherwise.
  - **AllowedToHaveApplication**– "True" if your license allows you to use and manipulate Application windows, "False" otherwise.
  - **AllowedToCrop** – "True" if your license allows you to get the cropping area and crop inputs, "False" otherwise.
  - **AllowedToUseJavascriptAPI**– "True" if your license allows you to use the Javascript API, "False" otherwise.
  - **HasMatroxNetworkAPI** – "False" if you have Matrox graphics cards and the Matrox Network API is not installed, "True" otherwise.
  - **LicenseVersionType** – A value representing your license type. Can be:
    - **Pro** – Galileo Pro Edition
    - **Normal** – Galileo Normal Edition
    - **WebClient** – Galileo Web Client Edition
    - **MobileFree** – Galileo For Mobile Edition
  - **VersionNumber** – The version of the Galileo software you have installed.

Outputs of Function functionOnFail

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.
  - **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.
  - **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6 Wall Modification Methods

7.6.1 GetInputs

Signature

```
GetInputs (functionOnSuccess, functionOnFail)
```

Description

Gets the list of inputs that are available on the server.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **0, 1, 2, 3 … n** (where n = Number of inputs available).
    - **Name** – The human-readable name of the input that is identical to the one in Galileo Clients
    - **ID** – The ID used to identify the Input. This ID must be sent to *OpenInput* in order to open the input
    - **Type** – The type of input. This type must be sent to *OpenInput* in order to open the input; one of the following:
      - **Matrox** – Video/graphics inputs. Can be compared to *VideoWallConnection.MatroxWindowsID.*
      - **Layout** – Layouts. Can be compared to *VideoWallConnection.LayoutWindowsID.*
      - **Application** – Software windows. Can be compared to *VideoWallConnection.ApplicationWindowsID.*
      - **ClientCapture** – Galileo Client Capture inputs. Can be compared to *VideoWallConnection.ClientCaptureWindowsID.*

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.2 OpenInput

Signature

```
OpenInput (ID, type, top, left, bottom, right, functionOnSuccess,
functionOnFail)
```

Description

Opens an input fetched from the **GetInputs** method.

Inputs

`ID`	The ID fetched from **GetInputs**. Even through it is not recommended, you can use a hard-coded ID if you are sure it won't change.
`type`	The type of input you want to open fetched from **GetInputs**; one of the following: ➢ *VideoWallConnection.MatroxWindowsID* – Video/graphic input windows ➢ *VideoWallConnection.LayoutWindowsID* – Layouts ➢ *VideoWallConnection.ApplicationWindowsID* – A software window ➢ *VideoWallConnection.ClientCaptureWindowsID* – Client Capture windows.
`top`	The Y coordinate of the top border of the input you want to display on a [0, 1] scale
`left`	The X coordinate of the left border of the input you want to display on a [0, 1] scale

bottom	The Y coordinate of the bottom border of the input you want to display on a [0, 1] scale
right	The X coordinate of the right border of the input you want to display on a [0, 1] scale

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

↳ **Data**

↳ **GUID** – The GUID of the new window opened on the video wall.

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.3 ModifyWindow

Signature

```
ModifyWindow (GUID, top, left, bottom, right, maximize,
functionOnSuccess, functionOnFail)
```

Description

Use this method to minimize, maximize or modify the position of a window. This method also automatically puts it in front of the others. Note that video/graphic input windows can only be ordered between themselves and not with any other type of windows and is beyond Galileo's control.

Inputs

`GUID`	The GUID of a window. This GUID cannot be copied or hard-coded.
`type`	The type of the input you want to open fetched from **GetInputs**.
`top`	The Y coordinate of the top border of the window you want to modify on a [0, 1] scale
`left`	The X coordinate of the left border of the window you want to modify on a [0, 1] scale
`bottom`	The Y coordinate of the bottom border of the window you want to modify on a [0, 1] scale
`right`	The X coordinate of the right border of the window you want to modify on a [0, 1] scale
`maximize`	A JavaScript boolean containing "true" if you want the window maximized and "false" if you want it minimized

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.4 GetWindowState

Signature

```
GetWindowState (functionOnSuccess, functionOnFail)
```

Description

This gets the state of all windows displayed on the video wall, including Input, Application, Client Capture, and Layout windows.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **0, 1, 2, 3 … n** (where n = Number of windows displayed).
    - **GUID** – The GUID of the current window.
    - **Name** – The human readable name of the window that is identical to the one in Galileo Client.
    - **Color** – The hexadecimal color of the window. The color returned is the same color as displayed on Galileo Client.
    - **ZOrder** – The Z Order of the window. 0 represents the bottom-most window.
    - **Visible** – "True" if the window is maximized, "False" otherwise.
    - **Position**
      - **Top** – The Y coordinate of the top border of the window on a [0, 1] scale.
      - **Left** – The X coordinate of the left border of the window on a [0, 1] scale.
      - **Bottom** – The Y coordinate of the bottom border of the window on a [0, 1] scale.
      - **Right** – The X coordinate of the right border of the window on a [0, 1] scale.

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.5 GetSingleWindowState

Signature

```
GetSingleWindowState (GUID, functionOnSuccess, functionOnFail)
```

Description

Returns the state of a single window as specified by the included GUID.

Inputs

`GUID`	The GUID of a window. This GUID cannot be copied or hard-coded.

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **GUID** – The GUID of the current window.
  - **Name** – The human readable name of the window that is identical to the one in Galileo Client.
  - **Color** – The hexadecimal color of the window. The color returned is the same color as displayed on Galileo Client.
  - **ZOrder** – The Z Order of the window. 0 represents the bottom-most window.
  - **Visible** – "True" if the window is maximized, "False" otherwise.
  - **Position**
    - **Top** – The Y coordinate of the top border of the window on a [0, 1] scale.
    - **Left** – The X coordinate of the left border of the window on a [0, 1] scale.
    - **Bottom** – The Y coordinate of the bottom border of the window on a [0, 1] scale.
    - **Right** – The X coordinate of the right border of the window on a [0, 1] scale.

Outputs of Function functionOnFail

An enum containing the following values:

- ↳ **Response**
  - ↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.
  - ↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.
  - ↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.6 CloseWindow

Signature

```
CloseWindow (GUID, functionOnSuccess, functionOnFail)
```

Description

Closes a single Galileo Window.

Inputs

GUID	The GUID of a window. This GUID cannot be copied or hard-coded.

Outputs of Function functionOnSuccess

An enum containing the following values:

- ↳ **Response**
  - ↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - ↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - ↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.7 CloseAllWindows

Signature

```
CloseAllWindows (windowType, functionOnSuccess, functionOnFail)
```

Description

Closes all windows of a specific type, or all windows of every type depending on the value of the argument.

Inputs

`windowType`	The type of the windows you want to close; one of the following: ➢ *VideoWallConnection.MatroxWindowsID* – Video/graphic input windows ➢ *VideoWallConnection.LayoutWindowsID* – Layouts ➢ *VideoWallConnection.ApplicationWindowsID* – Application windows ➢ *VideoWallConnection.ClientCaptureWindowsID* – Client Capture windows. ➢ *VideoWallConnection.AllWindowsID* – All windows.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.8 GetCroppingArea

Signature

```
GetCroppingArea (ID, type, functionOnSuccess, functionOnFail)
```

Description

Gets the cropping area and resolution of an input. **Only Input windows can be cropped**. Use this method to show only a portion of the input image.

Inputs

`ID`	The ID of the input.
`type`	The type of window for which you want to get the cropping area (always *VideoWallConnection.MatroxWindowsID*).

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **Position**
    - **Top** – The Y coordinate of the top border of the cropping area on a [0, 1] scale.
    - **Left** – The X coordinate of the left border of the cropping area on a [0, 1] scale.
    - **Bottom** – The Y coordinate of the bottom border of the cropping area on a [0, 1] scale.
    - **Right** – The X coordinate of the right border of the cropping area on a [0, 1] scale.
  - **Resolution**
    - **Horizontal** – The horizontal resolution of the input.
    - **Vertical** – The vertical resolution of the input.

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.9 CropInput

Signature

```
CropInput (ID, type, top, left, bottom, right, functionOnSuccess,
functionOnFail)
```

Description

Crops an input to the desired size, to show only a portion of the input image. **Only Input windows can be cropped.** Cropping affects every window displaying that input.

Inputs

`ID`	The ID of the input.
`type`	The type of window you want to crop (always *VideoWallConnection.MatroxWindowsID*).
`top`	The Y coordinate of the top border of the cropping area on a [0, 1] scale.
`left`	The X coordinate of the left border of the cropping area on a [0, 1] scale.
`bottom`	The Y coordinate of the bottom border of the cropping area on a [0, 1] scale.
`right`	The X coordinate of the right border of the cropping area on a [0, 1] scale.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

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(e) **Software:** Windows Input Simulator
Author: Michael Noonan
License: Microsoft Public License (Ms-PL)

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(f) **Software:** Simple Client Server Library
Author: Halil Ibrahim Kalkan
License: Code Project Open License (CPOL)

http://www.codeproject.com/info/cpol10.aspx

(g) **Software:** Farm-Fresh Web Icons
Author: Fat Cow Web Hosting
License: Creative Commons Attribution 3.0
http://www.fatcow.com/free-icons

(h) **Software:** Open-Sans Font Library
Author: Steve Matteson
License: Apache License 2.0

Please refer to (b) for license text.

(i) **Software:** CheckBoxList(For)
Author: Mikhail Tsennykh
License: Code Project Open License (CPOL)

http://www.codeproject.com/info/cpol10.aspx

CHAPTER 9 CONTACT INFORMATION

9.1 Corporate Headquarters

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Web: **www.rgb.com**

9.2 Sales and Product Information

Email: **sales@rgb.com**

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9.3 Technical Support

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Web: **http://www.rgb.com/support/**

SPECTRUM®

Galileo Competitive Analysis

Rev 01 • August 2014

Galileo vs Christie Phoenix

Feature	Galileo	Christie Phoenix
Architecture	Single chassis with direct and IP inputs	Multiple nodes Input: 2x DVI in; H.264 out Output: H.264 in; 2x DVI out
IP camera/video inputs (MPEG2, MPEG4, MJPEG, H.264)	12x HD, 60x SD	12x HD per node
Inputs up to 4K (3840x2160)	Yes, single link 15fps	No
High Frame Rate Remote Desktop	Yes – VDA	No – VNC, RDP
Configuration Size	Up to 56 outputs in single chassis	2 outputs per node, 128 outputs max
Output rotation (portrait/landscape)	Yes	Yes
HDCP support across all outputs	Yes	Yes

Galileo vs Christie Phoenix

Feature	Galileo	Christie Phoenix
Scripting interface for internal or external system control	Yes	Yes
Real-time processing – no artifacts	Yes	Yes
Transitions and animations	Yes	No
Dynamic scaling, pan & zoom	Yes	Yes
Free rotation of inputs	Yes	No
Bezel compensation & edge overlap	Yes	Yes
Tablet/Web – based control interface	Yes	Yes
Active Directory Support	Yes	No

Christie Phoenix – Weaknesses

- All direct (baseband) inputs forced to be IP
  - Scaling across wall may accentuate H.264 artifacts
  - Not as many inputs at higher frame rates can be processed
  - Lag time (input to output) of several frames from H.264 decoding
  - Slow to switch between inputs (vs baseband switching on Galileo)
  - Puts more strain on network
- No applications can be run on processor
- Costly
  - $7800/node ; $3900/port
    - each node has 2 DVI in or 2 DVI out based on their recommendations
- Granularity of 2 video in/out not optimal
  - Each additional 2 baseband inputs requires another node (unused additional processor, outputs, chassis etc.)

Christie Phoenix – Strengths (& Response)

- All IP architecture
  - Baseband inputs costly
- Supports multiple walls and single outputs
  - Galileo supports multiple walls via sub-regions/layouts
- Decodes 12 IP streams (1080p/30) per node
  - Baseband inputs costly, no analog inputs
- Desktop decoder client
  - Galileo has decoder client with KVM
- Audio support in control application
  - Galileo can control an external audio mixer/switcher
- DL-DVI 2560x1600p60 outputs
  - Galileo does 2560x1600p30, but it is not cost effective to build walls out of such expensive displays. There are plenty of pixels in the wall with HD displays.

SPECTRUM®

Galileo Competitive Analysis

Rev 01 • August 2014

Galileo vs Jupiter

Feature	Galileo	Jupiter FC4000
IP camera/video inputs (MPEG2, MPEG4, MJPEG, H.264)	16x HD, 60x SD (no input card required)	192x HD (Requires Decoder Cards)
Inputs up to 4K (3840x2160)	Yes, single link 15fps	No
Low Bandwidth Remote Desktop	Yes - VDA	No – High BW PixelNet
Up to 56x56 in a single chassis	Yes	No, 32 in OR out 96 in OR out (3 chassis)
Output rotation (portrait/landscape)	Yes	No?
Scripting interface for internal or external system control	Yes	Yes
Real-time processing – no artifacts	Yes	Yes (single chassis)
HDCP support across all outputs	Yes	No
Transitions and animations	Yes	No

Galileo vs Jupiter

Feature	Galileo	Jupiter FC4000
Dynamic scaling, pan & zoom	Yes	No
Free rotation of inputs	Yes	No
Bezel compensation & edge overlap	Yes	Yes
Tablet-based control interface	Yes	No (requires Canvas)
Active Directory Support	Yes	Yes

Jupiter Catalyst FC4000 – Weaknesses

- PCIe x4 slots (Galileo PCIe x16) and multiple chassis create I/O bottleneck
  - Limited video bandwidth causing image tearing or dropped frames
- Outdated processor
  - can't handle applications as well, slow response time
- No 4K input support
  - Dual-link 2560x1600 max
- No input or output rotation
- No HDCP support
- No transitions/animation
- No built-in tablet interface

Jupiter Catalyst FC4000 – Strengths

- Dual-link in/out
- Large # of streaming inputs (with additional cards)
- Large # of I/O (with additional chassis, and limited performance)

		RGB Spectrum Galileo GO-56-E5	**Crestron DM-MD64X64**
Video			
	Switcher	56x56 DVI/HDMI, plus 48 inputs of Analog Compsite, plus IP inputs, plus VDA remote control desktops, plus MS Windows Application Support	64x64 digital matrix
	Input Signal Types	Plug in blades supporting 56 DVI/HDMI/Display Port, plus 48 inputs of Analog Compsite BNC, plus IP inputs 10Gbps Ethernet, plus VDA remote control desktops, plus MS Windows Application Support. Fiber and HDBaseT support through transceivers	Plug-in blades supporting HDMI, DisplayPort Multimode, DVI, HDBaseT®, DM 8G+™, DM 8G® Fiber, and DM 8G SM Fiber, No IEEE Ethernet
	Output Signal Types	Plug in blades supporting 56 DVI/HDMI, plus IP outputs 10Gbps Ethernet, plus VDA remote control desktops, plus MS Windows Application Support. Fiber and HDBaseT support through transceivers	Plug-in blades supporting HDMI, DVI, HDBaseT, DM 8G+, DM 8G Fiber, and DM 8G SM Fiber
	Formats	SL-DVI,HDMI,Display Port, any IP codec supported by MS Windows 7, VDA remote control, VNC, RDP, any MS Windows Application Support. 3D, 4K, HDCP	HDMI, HDBaseT, or DM 8G w/Deep Color, 3D, & 4K; DVI; HDCP content protection support
	Input Resolutions	1920x1200 @ 60 Hz (SL-DVI, RGB/VGA) 2048x1536 @ 47 Hz (RGB/VGA) 2560x1600 @ 30 Hz (SL-DVI) 1920x1080i (Component) NTSC/PAL/SECAM (S-Video, Composite)	Up to 2048x1152@60Hz
	Maximum Output Resolutions	2048x1152 @ 60 Hz (SL-DVI) 2048x1536 @ 60 Hz (RGB/VGA)	2048x1152@60Hz
Audio			
	Switcher	Audio switching is not embedded in video. Switching is available out of band.	64x64 digital multi-channel audio-follow-video matrix switching, monitor output;
		Audio breakway is not applicable	Note: Audio breakaway is not supported
	Input Signal Types	Line input, IP encoded audio	Configurable via modular plug-in blades supporting HDMI, DisplayPort Multimode[10], HDBaseT[2], analog (stereo 2-channel)[1], DM 8G+[2], DM 8G Fiber, and DM 8G SM Fiber
	Output Signal Types	Line input, IP encoded audio	Configurable via modular plug-in blades supporting HDMI[1], HDBaseT, analog (stereo 2-channel)[1], DM 8G+, DM 8G Fiber, and DM 8G SM Fiber
	Formats	Dolby Digital®, Dolby Digital EX, Dolby Digital Plus, Dolby® TrueHD, DTS®, DTS-ES, DTS 96/24, DTS-HD High Res, DTS-HD Master Audio™, up to 8ch PCM	Dolby Digital®, Dolby Digital EX, Dolby Digital Plus, Dolby® TrueHD, DTS®, DTS-ES, DTS 96/24, DTS-HD High Res, DTS-HD Master Audio™, up to 8ch PCM
Communications			
	Ethernet	10/100/1000 Mbps, auto-switching, auto-negotiating, auto-discovery, full/half duplex, DHCP, Web server for remote configuration and operation	10/100/1000 Mbps, auto-switching, auto-negotiating, auto-discovery, full/half duplex, DHCP, Web server for remote configuration and operation
	USB	USB 2.0 and 3.0	USB signal routing via select transmitters, receivers, and extenders; USB service port for computer console
	DigitalMedia	SL-DVI, SM and MM Fiber via Tranceiver, HDBaseT vis Transceiver, HDCP management, EDID format management, CEC	DM 8G+ (HDBaseT compliant)[2], DM 8G Fiber, DM 8G SM Fiber, HDCP management, EDID format management, CEC
Ethernet Switch			
		2 ea 10Base-T/100Base-TX/1000Base-T LAN	19-port switch with Private Network Mode;
USB Switch			
		USB over IP delivered using RGB Spectrum VDA	64x64 matrix, follow video or breakaway
Blade Slots			
	INPUT	14 slots for DVI/HDMI input and output. Each card supports 4 inputs and 4 outputs Slots support 16 lane PCIe and can be populated with standard PCIe boards as well for	8 slots proprietaryDM switcher input blade slots, hot-swappable; Each slot accepts (1) DMB-I series input blade
	OUTPUT	14 slots for DVI/HDMI input and output. Each card supports 4 inputs and 4 outputs	8 slots proprietary DM switcher output blade slots, hot-swappable; Each slot accepts (1) DMB-O series output blade

		RGB Spectrum Galileo GO-56-E5	**Crestron DM-MD64X64**
	CPU	i7 (8GB RAM, 500GB SSD) Processor or Dual Xeon E5 (8GB RAM, 500GB SSD) Processor	Accepts (1) DMB-CPU-64 CPU blade - specification unknown
Connectors – CPU			
	LAN	2 ea 10Base-T/100Base-TX/1000Base-T LAN ports, expandable using plug in expansion modules to support 4x10Gbps uplinks: Copper 10Gigabit Ethernet, 10GBASE-T, IEEE 802.3an,Gigabit Ethernet, 1000Base-T,100 Mb Ethernet: 100BASE- TX; 20 Gb/s, 2000Mb/s and 200	(1) 8-wire RJ45 female;
			10Base-T/100Base-TX/1000Base-T Ethernet port
	SERVICE	USB 2.0	(1) 8-wire RJ45 female;
			Computer console port
	STORAGE	1 500GB HDD installed 4 – 3.5" drive bays support up to eight 2.5" HDD carriers, removable and hot swap are available upon request. 1 – Slim-line device bay for optical drive media. Other drive bay configurations are available upon request.	(1) SD memory card slot;
			Accepts one SD™ or SDHC™ card up to 32 GB for memory expansion (2 GB SD card included);
			For save/load of configuration and EDID settings, and firmware update
	AUDIO OUT	Option via Audio Line Out card	(1) 5-pin 3.5mm detachable terminal block;
		Balanced/unbalanced stereo line-level output;	Balanced/unbalanced stereo line-level output;
		Output Impedance: 200 Ohms balanced, 100 Ohms unbalanced;	Output Impedance: 200 Ohms balanced, 100 Ohms unbalanced;
		Maximum Output Level: 4 Vrms balanced, 2 Vrms unbalanced	Maximum Output Level: 4 Vrms balanced, 2 Vrms unbalanced
Connectors – Main Chassis			
	100-127V~50/60Hz 16A,	(2) IEC 60320 C-20 main power inlets;	(2) IEC 60320 C-20 main power inlets;
	200-240V~50/60Hz 8A	Mate with removable power cords, included	Mate with removable power cords, included
	G	(1) 6-32 screw, chassis ground lug	(1) 6-32 screw, chassis ground lug
	COMPUTER (front)	(1) USB Type B female;	(1) USB Type B female;
		USB computer console port (6 ft cable included)	USB computer console port (6 ft cable included)
Touch Screen			
		Not required. System is supported with IP	15 inch (381 mm) diagonal TFT active matrix
			Provides signal routing, video input preview,
Controls & Indicators			
	Touch Screen Hard Key	Not applicable	(1) pushbutton, not used
	POWER SUPPLIES, 1 – 2	Amber LED, indicates healthy power supply	(2) green LEDs, indicate when each corresponding supply is functioning
	POWER SUPPLIES, FAULT	LED flashes RED indicates a fault with either supply	(1) red flashing LED, indicates a fault with either supply
	HW-R	Recessed miniature pushbutton for hardware reset, reboots the switcher	(1) recessed miniature pushbutton for hardware reset, reboots the switcher
	ACT (rear, CPU)	Green LED, indicates CPU activity	(1) green LED, indicates CPU activity
	MSG (rear, CPU)	Green LED, indicates HDD activity	(1) red LED, indicates CPU has generated an error message
	CPU RESET (rear, CPU)	Recessed miniature pushbutton, reboots the CPU and front panel	(1) recessed miniature pushbutton, reboots the CPU and front panel
	LAN (rear, CPU)	(2) LEDs, green LED indicates Ethernet link status, amber LED indicates Ethernet activity	(2) LEDs, green LED indicates Ethernet link status, amber LED indicates Ethernet activity
	SERVICE (rear, CPU)	NA	(2) LEDs, green LED indicates Ethernet link status, amber LED indicates Ethernet activity
	OK (rear, power supplies)	NA	(2) green LEDs, indicate when each corresponding supply is powered and functioning
	! (rear, power supplies)	NA	(2) amber LEDs, each indicates a fault with the corresponding supply
Power Requirements			

		RGB Spectrum Galileo GO-56-E5	**Crestron DM-MD64X64**
	Main Power	16 Amps @ 100-127 Volts AC or 8 Amps @ 200-240 Volts AC, 50/60 Hz;	16 Amps @ 100-127 Volts AC or 8 Amps @ 200-240 Volts AC, 50/60 Hz;
		Requires (2) 20 Amp @ 100-127V, or (2) 10 Amp @ 200-240V, AC circuits	Requires (2) 20 Amp @ 100-127V, or (2) 10 Amp @ 200-240V, AC circuits
Redundant Power Supplies			
	Quantity/Type	2 ea 1485W, N + 1	(2) high efficiency (>90%), hot-swappable, variable speed fan cooled, Crestron model DM-MDA-64-PWS (included)
	Demonstrated MTBF	>500,000 hours per power supply	>500,000 hours per power supply
	Redundancy	Complete unit continues to operate at full capacity on one or more functioning power supplies	Complete unit continues to operate at full capacity on one or more functioning power supplies
Environmental			
	Temperature	32° to 104°F (0° to 40°C)	32° to 104°F (0° to 40°C)
	Humidity	10% to 90% RH (non-condensing)	10% to 90% RH (non-condensing)
	Heat Dissipation	TBD	5460 BTU/hr maximum, 3000 BTU/hr typical, with all blade slots occupied
Enclosure			
	Chassis	Metal with black finish, integrated rack ears, vented sides and rear, fan-cooled	Metal with black finish, integrated rack ears, vented sides and rear, fan-cooled
	Faceplate	Metal, black finish	Metal, black finish with polycarbonate label overlay, plastic touch screen bezel
	Mounting	5U 19-inch rack mountable	14U 19-inch rack-mountable (rack ears built in)
Dimensions			
	Height	8.75 in	24.44 in (621 mm)
	Width	19 in	19.00 in (483 mm)
	Depth	23 in	16.26 in (413 mm) without I/O blades
Weight			
		34.8 lbs without I/O cards	49.0 lb (22.3 kg) without I/O blades

	RGB Spectrum Galileo GO-56-E5	**Jupiter Fusion Catalyst 4000**
Main Chassis		
CPU Board		
Processor		
	i7 (8GB RAM, 500GB SSD) Processor or Dual Xeon E5 (8GB RAM, 500GB SSD) Processor	2 Intel Quad Core Xeons
System memory		
	8GB RAM; Optional 16, 32, 64GB	FC8000 & FC4000: 8GB RAM; Optional 16, 32, 64GB
Expansion slots		
	14 PCI Express 2.0 x 16 lane slots, 3 PCI Express 2.0 x 1 lane slots. 10 Slot expansion chassis expected Q1 2014	FC4000: 16 PCI Express 2.0 x4 slots (48 max with two 16-slot FC4000 Expansion Chassis)
PCI Express 2.0 Switch		
	Non-blocking architecture, PCI Express 2.0 16 lane. PCI Express 3.0 expected Q1 2014	Non-blocking architecture, PCI Express 2.0
Disk Storage		
Hard disk		
	1 500GB HDD installed 4 – 3.5" drive bays support up to eight 2.5" HDD carriers, removable and hot swap are available upon request. 1 – Slim-line device bay for optical drive media. Other drive bay configurations are available upon request.	FC4000: 2 hot-swap 500GB HDD, RAID 1 (3rd drive, RAID 5, 256GB SSD optional)
Optical Storage		
	DVD-RW/CD-RW optional on request	DVD-RW/CD-RW
Network Interface		
Ethernet		
	10/100/1000 Mbps, auto-switching, auto-negotiating, auto-discovery, full/half duplex, DHCP, Web server for remote configuration and operation	Dual 10/100/1000 Mbps RJ45 ports; more optional
Input Devices (USB)		
	USB 2.0 and 3.0	FC1000 & FC4000: Wired 104-key keyboard & mouse
Touch Panel Support	Not required. System is supported with IP based control software as well as user interface on wall which can be used for configuration	
IP control protocols		
Connection to External Chassis		
	10 Slot expansion chassis expected Q1 2014	FC4000: 2 x8 slots for links to Expansion Chassis
PCI Express Input		
	16-lane PCI Express 2.0 inter-chassis connection	16-lane PCI Express 2.0 inter-chassis connection
Expansion slots		
	14 PCI Express 2.0 x 16 lane slots, 3 PCI Express 2.0 x 1 lane slots. 10 Slot expansion chassis expected Q1 2014	20 slots in each Switch Fabric Chassis
Graphis Input		

	RGB Spectrum Galileo GO-56-E5	**Jupiter Fusion Catalyst 4000**
	Plug in blades supporting 56 DVI/HDMI/Display Port, plus 48 inputs of Analog Compsite BNC, plus IP inputs 10Gbps Ethernet, plus VDA remote control desktops, plus MS Windows Application Support. Fiber and HDBaseT support through transceivers	Dual-Link DVI-I Input Card
Graphics memory		
	2 GB Per Card, Shares between Input and Output	256 MB per card
Output channels supported		
	56 in base chassis, 40 in expansion chassis.	FC4000: Up to 96
Resolution		
Input	1920x1200 @ 60 Hz (SL-DVI, RGB/VGA) 2048x1536 @ 47 Hz (RGB/VGA) 2560x1600 @ 30 Hz (SL-DVI) 1920x1080i (Component) NTSC/PAL/SECAM (S-Video, Composite)	Digital: 640x480 to 2560x1600 pixels per output Analog: 640x480 to 2048x1536 pixels per output
Output	2048x1152 @ 60 Hz (SL-DVI) 2048x1536 @ 60 Hz (RGB/VGA)	Match to input
	Custom output modes possible in both analog and digital	Custom output modes possible in both analog and digital
Color Depth		
	24 bits per pixel	32 bits per pixel
Output signal		
	Plug in blades supporting 56 DVI/HDMI, plus IP outputs 10Gbps Ethernet, plus VDA remote control desktops, plus MS Windows Application Support. Fiber and HDBaseT support through transceivers	DVI-I connector (supports single-link and dual-link DVI, and analog VGA with adapter)
		Dual DVI/RGB/HD Input Card (Optional)
Input channels supported		
	56 HDMI/DVI in base chassis, 40 in expansion chassis. 48 analog channels in base chassis	FC4000: Up to 94
Format		
	Dual-Link DVI up to 2560x1600, Single-Link DVI up to 2048x1200, progressive scan component HD (480p, 720p, 1080p), and analog RGB with any sync type (composite, separate, sync on green) up to 2048x1200	Dual-Link DVI up to 2560x1600, Single-Link DVI up to 2048x1200, progressive scan component HD (480p, 720p, 1080p), and analog RGB with any sync type (composite, separate, sync on green) up to 2048x1200
Pixel rate		
	165 MHz	Digital: Up to 270 MHz
		Analog: Up to 210 MHz
Pixel format		
	24 bits per pixel	32 bits per pixel
Windows		
	Unlimited destinations per card	4 destination windows per card
Octal SD Video Input Card (Optional)		
Input channels supported		
	Up to 272 in base chassis	FC4000: Up to 328

	RGB Spectrum Galileo GO-56-E5	**Jupiter Fusion Catalyst 4000**
Input format		
	NTSC, PAL	NTSC, PAL
Windows		
	Unlimited destinations per card	16 destination windows per card
Octal Video Connection Module		
	BNC-F connectors support S-Video or Composite	Dual BNC-F connectors support S-Video or Composite on 1RU 19” rackmount panel with 2 BNC sub-panels
	No subpanel required	Each sub-panel has 16 BNC connectors for 8 Composite or 8 S-video signals
Quad HD Decoder Input Card (Optional)		
	Integrated HD and SD video decoding on processor board	Integrated HD & SD video decoding
	2 ea 10Base-T/100Base-TX/1000Base-T LAN ports, expandable using plug in expansion modules to support 4x10Gbps uplinks: Copper 10Gigabit Ethernet, 10GBASE-T, IEEE 802.3an,Gigabit Ethernet, 1000Base-T,100 Mb Ethernet: 100BASE- TX; 20 Gb/s, 2000Mb/s and 200 Mb/s in full duplex mode per port. Automatic bypass on failure: 3,276,800 mSec (3,276.8 Sec): Maximum 100 mSec (0.1 Sec) : Minimum WDT Interval = (2^wdt_interval_parameter)*(0.1) sec. wdt_interval_parameter: { Valid Range: 0-15}	4 GigE connections, 1 per decoder
	Decodes H.264, MJPEG, MPEG-2, H.265 over RTP, RTSP, HTTP. Support ONVIF	Supports most popular IP cameras and encoders
	Supports hi res, real-time decoding of computer streams	Supports hi res, real-time decoding of computer streams
Input channels supported		
	Up to 480 SD streams (total decode capacity is 16x1080p30)	FC4000: Up to 164, HD or SD streams
CatalystLink Input Card (Optional)		
	NA	For PixelNet integration
	NA	Each CatalystLink card features 4 PixelNet ports and supports up to 8 PixelNet Input Nodes
	NA	Support for most PixelNet input types
	NA	4 destination windows per card
Other		
Rackmount Chassis		
Dimensions	8.75 in x 19 in x 23 in	7” H x 19” W x 22” D (17.8 cm x 48.3 cm x 55.9 cm)
Weight		
	34.8 lbs without I/O cards	51 lbs. (23.1 kg.)
Shipping weight		
	60 lbs	All chassis: 72 lbs. (32.7 kg.)
Operating Range		
Temperature		

	RGB Spectrum Galileo GO-56-E5	**Jupiter Fusion Catalyst 4000**
	Operating: 32°F – 104°F (0°C – 40°C)	Operating: 32°F – 104°F (0°C – 40°C)
	Non-operating: 14°F – 150°F (-10°C – 66°C)	Non-operating: 14°F – 150°F (-10°C – 66°C)
Humidity		
	10-90% non-condensing	10-90% non-condensing
Altitude		
	Up to 10,000 feet (3,048.0 m)	Up to 10,000 feet (3,048.0 m)
Electrical Requirements		
Input voltage		
	100-240 VAC, auto-ranging power supply	100-240 VAC, auto-ranging power supply
Line frequency		
	50-60 Hz	50-60 Hz
Power consumption		
	1485 W per chassis	FC8000 & FC4000: 600 Watts, maximum per chassis
Regulatory		
United States		
	UL 60950 listed, FCC Class A	UL 60950 listed, FCC Class A
Canada		
	cUL CSA C22.2, No. 60950	cUL CSA C22.2, No. 60950
International		
	CE Mark, CB Certificate and Mark, IEC 60950, CCC, VCCI	CE Mark, CB Certificate and Mark, IEC 60950, CCC, VCCI

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHTS OF LIGHTING FIXTURES AND SWITCHES WITH TJPA REPRESENTATIVE. ARCHITECTURAL DRAWINGS TAKE PRECEDENCE OVER ENGINEERING DOCUMENTS FOR EXACT LOCATIONS, MOUNTING HEIGHTS, FINISHES AND SUSPENSION LENGTHS OF ALL ELECTRICAL EQUIPMENT AND DEVICES, LIGHT FIXTURES AND SWITCHES.

B. PROVIDE CONDUIT AND WIRE FOR COMPLETE SYSTEM PER CIRCUITING AND SWITCHING SHOWN.

SHEET NOTES CON'T.

C. FIELD COORDINATE EXACT ROUTING OF ALL FEEDERS AND BRANCH CIRCUITS.

D. MOUNT ALL REMOTE TRANSFORMERS, BALLASTS, DRIVERS, ETC. ABOVE CEILING IN ACCESSIBLE LOCATION. REFER TO ARCHITECTURAL AND INTERIOR DESIGN DRAWINGS FOR CEILING ACCESS LOCATIONS. WIRE ALL TRANSFORMERS, BALLASTS, DRIVERS, ETC. PER MANUFACTURER'S RECOMMENDATION.

E. COORDINATE WORK WITH RELATED TRADES TO ALLOW THE WORK OF RELATED TRADES TO BE INSTALLED SATISFACTORILY AND WITH THE LEAST POSSIBLE CONFLICT OR DELAY.

SHEET E1-4404 SHEET NOTES CON'T.

F. WHEREVER WORK INTERCONNECTS WITH WORK OF OTHER TRADES, COORDINATE WITH OTHER TRADES TO INSURE THAT THEY HAVE THE INFORMATION NECESSARY SO THAT THEY MAY PROPERLY INSTALL THE NECESSARY CONNECTIONS AND EQUIPMENT.

G. CONNECT ALL SWITCHED NORMAL CIRCUITS TO LRC-2-B-1.

H. CONNECT ALL NORMAL 277V DIMMED CIRCUITS TO DMH-2-B-1, UON.

SHEET NOTES CON'T.

I. CONNECT ALL NORMAL 120V DIMMED CIRCUITS TO DML-2-B-1, UON.

J. CONNECT ALL EMERGENCY 277V DIMMED AND SWITCHED CIRCUITS TO EDMH-1-C-EMG LOCATED IN ELEC RM 01421, UON. (D)

K. PROVIDE UNSWITCHED "HOT" LEG TO ALL ILLUMINATED EXIT SIGN AND NIGHT LIGHT "NL" FIXTURES. CONNECT TO NEAREST ADJACENT EM CIRCUIT, UON.

L. REFER TO SHEET E1-4001 FOR CIRCUITING ORIENTATION PLAN.

NUMBERED NOTES

1. PROVIDE FIXTURE WITH INTEGRAL BATTERY PACK 90-MINUTE MINIMUM RUN TIME.
2. LOCATE LOCKABLE SWITCH +48" ABOVE LOWEST LANDING FLOOR LEVEL NEXT TO THE ACCESS LADDER. COORDINATE EXACT LOCATION WITH ELEVATOR MANUFACTURER PRIOR TO ROUGH-IN.
3. POWER DISCONNECT TO ESCALATOR LIGHT AND RECEPTACLE. COORDINATE MOUNTING WITH ESCALATOR MANUFACTURER PRIOR TO ROUGH-IN.

NUMBERED NOTES CON'T.

4. CONNECT ALL ESCALATOR HANDRAIL LIGHTS TO CIRCUIT INDICATED. REFER TO SHEET E1-4404 FOR CONTINUATION OF CIRCUIT.
5. COORDINATE WORK WITH DESIGN/BUILD GLAZING SYSTEM SCOPE OF WORK, UON.
6. CONNECT TO LRC-2-C-1. LOCATE LED DRIVERS IN ELEC RM 02422.

ZONE 03 | ZONE 04 | SHEET E1-4403 | SHEET E1-4404 | 13 | 14 | 15 | 16 | 16.9 | 17 | 18 | ZONE 04 | ZONE 05 | SHEET E1-4404 | SHEET E1-4405

A B C C.3 D D.4 D.8 E E.2 E.6 F F.7 G H J K

RETAIL TYPE A-3 02463 | 02464 | 02465 | 02466 | 02467 | 02468 | 02469 | 02470 | 02471 | 02472 | 02473 | 02474 | 02475 | 02476 | 02477 | 02478 | 02479 | 02480 | 02481 | 02482 | 02483

SERVICE CORRIDOR 02323 | JANITOR'S ROOM 02484 | GARBAGE STORAGE 02487 | VESTIBULE 02422 | EAST EMERGENCY GENERATOR ROOM 02421 | DISHWASHER 02488 | IT SERVICE 02485 | SCRUBBER ROOM 02486 | ELECTRICAL ROOM 02424 | STAIR 401 02401 | SHAFT 02423 | FOOD COURT 02320 | STAIR 405 02405

LE225 S129 | LE210 S212 | LE210 S213 | LE216 S223,EM | LE216 S224,EM | LE216 S225,EM | LE225 S341 | DMH-2-C-1

ELP-2-B-LRS/1 | ELP-2-B-LRS/5 | EDMH-1-C-EMG/1 | EDMH-1-C-EMG/2 | EDMH-1-B-EMG | LPH-2-B-1 | LRC-2-B-1 | DMH-2-B-1 | LPH-2-B-12 | LP-2-B-1 | DML-2-B-1 | EDMH-2-B-EMG | ELPH-2-B-EMG | ELP-2-B-EMG | LRC-2-C-1 | LPH-2-C-1 | LPH-2-C-12 | LP-2-C-1 | DML-2-C-1 | DMH-2-C-1 | EDMH-2-C-EMG | ELPH-2-C-EMG | ELP-2-C-EMG

LE204 S226,TYP. (6)

DATA CONTROL SIGNAL IS REQUIRED IN ADDITION TO POWER FOR THIS FIXTURE TYPE

ALTERNATE NO. 12
DELETE CEILING COFFERS, LED LIGHTING & LIGHTING CONTROLS PER SECTION 01 10 30.

NOTE: SEE GROUND LEVEL RCP FOR EXTERIOR GLASS CANOPY MOUNTED LIGHT FIXTURE TYPE LE221 CONTROL GROUPS.

PROJECT NORTH / TRUE NORTH

ZONE 03 | ZONE 04 | ZONE 11 | SHEET E1-4404 | ZONE 04 | ZONE 05

2 E1-2001 SECOND LEVEL ZONE 04 LIGHTING PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

Sep 03, 2014 - 4:29pm P:\2008\14200---Transbay_Terminal\CAD\ELEC\SKETCH-PH1\SKE-RFI-TG10.4-563.dwg

user01350

XREFS: XAGRID.dwg\ XAGRID-96.dwg\ XAZONES.dwg\ XAFLR02PH1.dwg\ XERCP02PH1.dwg\ XARCP02PH1.dwg\ TJPA-TB 34x44E.dwg\ CFH-STAMP.dwg

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ISSUED FOR CONSTRUCTION

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TRANSBAY JOINT POWERS AUTHORITY

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Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
2	02/21/14	ISSUED FOR BID - ADDENDUM #1	CFH
3	03/21/14	ISSUED FOR BID - ADDENDUM #2	CFH
4	04/23/14	ISSUED FOR BID - ADDENDUM #3	CFH

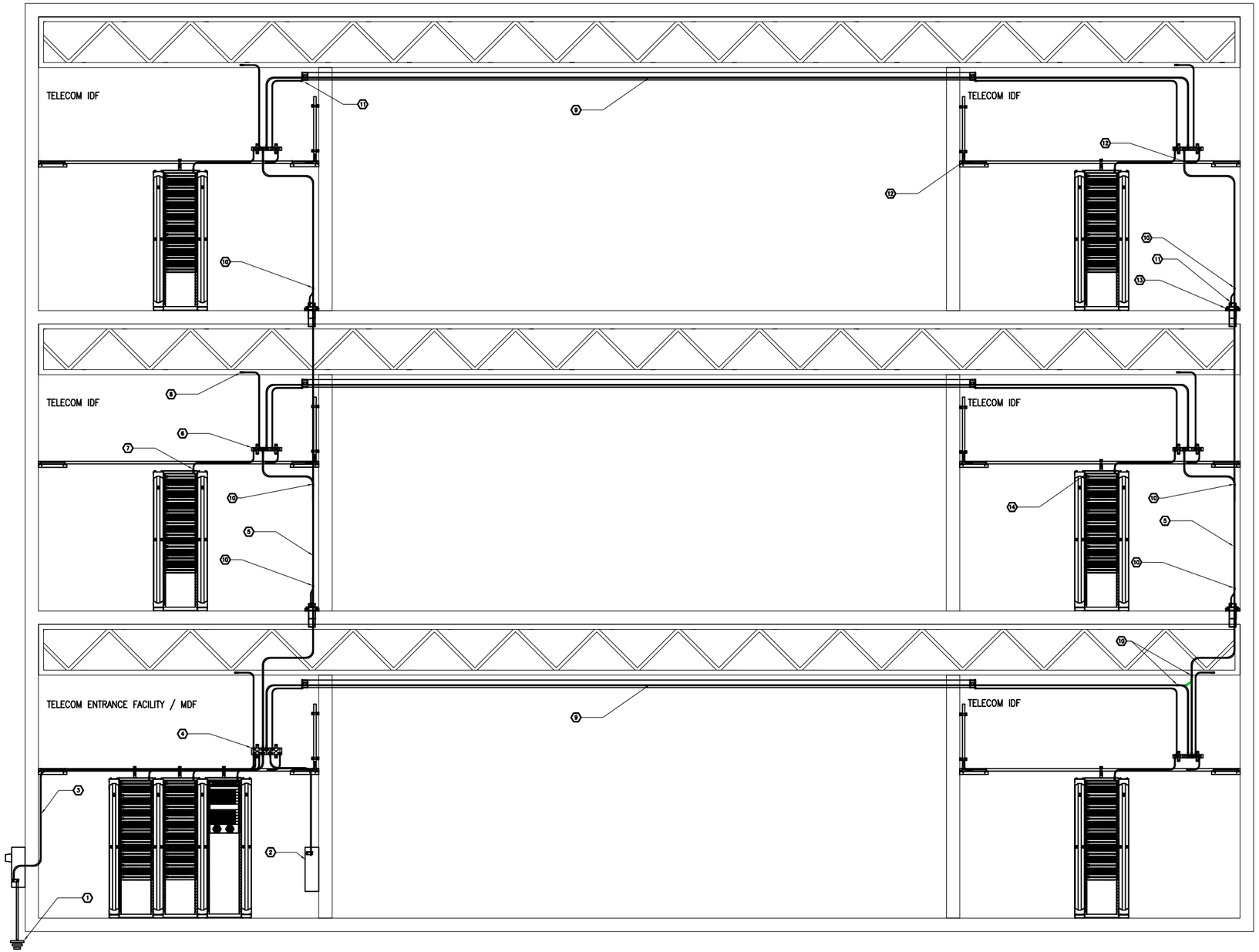
CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE: TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE: SECOND LEVEL ZONE 04 LIGHTING PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER · CAROLINE FENLON · No. E 23580 · ELECTRICAL · STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	C. FENLON-HARDING
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	C. FENLON-HARDING
DESIGNED BY: L. SERRANO	CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS	DATE: 04/23/2014
SCALE: 1/8" = 1'-0	SIZE: E; FACILITY NO.: 140; REVISION: D
SHEET NUMBER: SKE-TG10.4-RFI-563	SEQUENCE NUMBER: __ of __



TELECOM KEY NOTES:

1. BUILDING GROUNDING ELECTRODE
2. PRIMARY PROTECTOR
3. BONDING CONDUCTOR FOR TELECOMMUNICATIONS (BCT)
4. TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)
5. TELECOMMUNICATION BONDING BACKBONE (TBB)
6. TELECOMMUNICATIONS GROUNDING BUSBAR (TGB)
7. TELECOMMUNICATIONS EQUUIPMENT BONDING CONDUCTOR (TEBC) TO RACK
8. BUILDING STEEL BONDING CONNECTION (TYP)
9. GROUNDING EQUALIZER – FIRST, TOP, AND EVERY THIRD FLOOR
10. IRREVERSIBLE C–TYPE COMPRESSION TAP CONNECTION TO TBB (TYP)
11. BONDING CONDUCTOR CONNECTION TO PATHWAY (TYP)
12. BONDING METALLIC COMPONENTS (TYP)
13. EZ–PATH FIRE RATED PATHWAY (TYP)
14. STAR WASHER TO BOND COMPONENTS TO RACK (TYP)

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PROJECT:
TRANSBAY TRANSIT CENTER

TITLE:
TELECOM BONDING AND GROUND INFRASTRUCTURE

DRAWN BY:	RA
SCALE:	NTS
DATE:	9/9/2014
JOB NO.	08285
SHEET NO.	TSK-0047

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